Teledyne WAH CHANG
053 0536 095

FIFTH FIVE-YEAR REVIEW REPORT FOR
TELEDYNE WAH CHANG SUPERFUND SITE
LINN COUNTY, OREGON

Prepared by

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12/19/17
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LIST OF ABBREVIATIONS & ACRONYMS

µg/L	Micrograms per liter
µrem	Micro-roentgen
ASA	Acid Sump Area
ATI	ATI Millersburg
AWQC	Ambient Water Quality Criteria
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Contaminant of Concern
CoGen	Co-Generation
DCA	Dichloroethane
DCE	Dichloroethene
DNAPL	Dense Non-aqueous Phase Liquid
EFSC	Energy Facility Siting Council
EISB	Enhanced In Situ Bioaugmentation
EPA	U.S. Environmental Protection Agency
ESD	Explanation of Significant Difference
FCCA	Former Crucible Cleaning Area
FMA	Feed Makeup Area
FS	Feasibility Study
FYR	Five-Year Review
GETS	Groundwater Extraction and Treatment System
HI	Hazard Index
IC	Institutional Control
LRSP	Lower River Solids Pond
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MIBK	Methyl Isobutyl Ketone
NPL	National Priorities List
OAR	Oregon Administrative Rule
ODEQ	Oregon Department of Environmental Quality
OHD	Oregon Health Department
OU	Operable Unit
PCB	Polychlorinated Biphenyl
PCE	Tetrachloroethene
pCi	Picocuries
PRP	Potentially Responsible Party

RA	Remedial Action
RAO	Remedial Action Objective
RI	Remedial Investigation
ROD	Record of Decision
SAA	Soil Amendment Area
SEA	South Extraction Area
SMCL	Secondary Maximum Contaminant Limit
SVOC	Semivolatile organic compound
TCA	Trichloroethane
TCE	Trichloroethene
TWC	Teledyne Wah Chang
UU/UE	Unlimited Use and Unrestricted Exposure
VC	Vinyl Chloride
VOC	Volatile Organic Compound
Wah Chang	Teledyne Wah Chang Superfund Site

I. INTRODUCTION

The purpose of a Five-Year Review (FYR) is to evaluate the implementation and performance of a remedy to determine if the remedy is and will continue to be protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in five-year review reports such as this one. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The U.S. Environmental Protection Agency (EPA) is preparing this FYR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121, consistent with the National Contingency Plan (40 Code of Federal Regulations Section 300.430(f)(4)(ii)), and considering EPA policy.

This is the fifth FYR for the Teledyne Wah Chang (TWC) Superfund Site (Wah Chang). TWC was purchased by ATI Millersburg (ATI) in 1999, and ATI is currently responsible for fulfilling the obligations of the Consent Decree. The triggering action date for this statutory review is the completion date of the last FYR, December 29, 2012. The FYR has been prepared because hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure (UU/UE).

This site consists three operable units (OUs), all of which are addressed in this FYR:

- Operable Unit 1 (OU1); Sludge Ponds (EPA 1989)
- Operable Unit 2 (OU2); Groundwater and Sediment (EPA 1994)
- Operable Unit 3 (OU3); Surface and Subsurface Soil (EPA 1995).

The Teledyne Wah Chang FYR was led by Ravi Sanga, Remedial Project Manager, EPA Region 10. Participants included Debra Sherbina, Community Involvement Coordinator, EPA Region 10, Stephanie Mairs, EPA Assistant Regional Counsel, EPA Region 10, and Greg Aitken, for Oregon Department of Environmental Quality (ODEQ). The responsible party, ATI, was notified of the initiation of the FYR. The review began in January 2017.

Several Solid Waste Management Units (SWMUs) are located on the Wah Chang property. These SWMU are regulated under the Resource Conservation and Recovery Act, and regulatory oversight is conducted by the State of Oregon. These SWMU sites are not currently impacting the site groundwater, and are not discussed in this FYR.

Site Background

Wah Chang is an operating zirconium and other non-ferrous metals manufacturing plant located in Millersburg, approximately 2 miles north of downtown Albany and approximately 20 miles due south of Salem, Oregon in a populated area (Figure 1). The site is expected to remain an active operating facility for the foreseeable future. Current site use is industrial, and the site is located within an area in Millersburg that is zoned for heavy industry. Approximately 85 percent of the property is occupied by 180 buildings situated on 110 acres of land that are paved, gravel-covered, or vegetated. The site is within the Willamette River Valley along the east bank of the river. Portions of the property are located within the Willamette River's 100- and 500-year flood plains. Riparian areas along the site's western boundary are densely vegetated. In addition, the site is bounded to the east by Old Salem Road and Interstate 5. More physical characteristics of the site are described in the Fourth FYR (EPA 2012a).

Wah Chang's manufacturing process involves several physical, chemical, and electrochemical steps that concentrate zircon, hafnium, vanadium, niobium, titanium, and radioactive byproduct such as uranium and thorium. Current and historic waste management programs include process wastewater treatment, lime solid storage, solid waste management, hazardous waste management, and radioactive waste management.

The site is comprised of the following main locations:

- Main Plant Area – The central area of the manufacturing process for zirconium and non-ferrous metal production. Site areas linked to the manufacturing process are described as follows:

  - Extraction Area – The Extraction Area, shown in Figure 2, is a 40-acre portion of the site located south of Truax Creek. Zircon sand is processed into hafnium and zirconium. The Extraction Area includes the Feed Makeup Area (FMA) and the South Extraction Area (SEA).

  - Fabrication Area – The Fabrication Area, shown in Figure 3, is a 50-acre area located north of Truax Creek. The Fabrication Area includes the Acid Sump Area (ASA), Ammonium Sulfate Storage, Material Recycle, Dump Master, and former Crucible Cleaning Areas.

- Solids Area – The Solids Area, shown in Figure 4, is a 20-acre area located west of the Fabrication Area. Subareas include the Lower River Solids Pond (LRSP), Schmidt Lake, Chlorinated Residue Pile, and the Magnesium Resource Recovery Pile. This area received solids from the wastewater treatment system.

- Farm Ponds Area – The Farm Ponds Area, shown in Figure 5, is an approximately 115-acre parcel located 0.75 mile north of the Main Plant. This area formerly included four 2.5-acre storage ponds that received the plant's wastewater treatment lime solids.

- Soil Amendment Area (SAA) – The SAA is a 40-acre parcel currently owned by the City of Millersburg that is located north of the Farm Ponds Area. This area received a one-time application of lime solids in 1976 from the LRSP in an ODEQ-permitted action. The land is currently leased for agricultural purposes.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Teledyne Wah Chang		
EPA ID: ORD050955848		
Region: 10	**State:** OR	**City/County:** Millersburg/Linn
SITE STATUS		
NPL Status: Final		
Multiple OUs? Yes	**Has the site achieved construction completion?** Yes	
REVIEW STATUS		
Lead agency: EPA		
Author name (Federal or State Project Manager): Ravi Sanga		
Author affiliation: EPA Region 10		
Review period: 12/29/2016-12/28/2017		
Date of site inspection: 3/14/2017		
Type of review: Statutory		
Review number: 5		
Triggering action date: 12/28/2012		
Due date ***(five years after triggering action date)*****:** 12/28/2017		

II. RESPONSE ACTION SUMMARY

In response to releases or a substantial threat of a release of a hazardous substance at or from the site, EPA placed TWC on the National Priorities List (NPL) in October 1983, and Wah Chang commenced a Remedial Investigation (RI)/Feasibility Study (FS) for the Site in 1987 under Consent Order (Docket No. 1086-02-19-106). A site chronology is provided in Appendix A.

Operable Unit 1 – Sludge Ponds

Basis for Taking Action

The basis for EPA taking action at OU1 was prompted by EPA's concerns that hazardous materials from the unlined sludge ponds (LRSP and Schmidt Lake) were a likely source of groundwater contamination; were located in the Willamette river flood plain; and they contained radioactive materials, and thus were the focus of community concerns.

Response Actions

The Record of Decision (ROD) for OU1 was signed by EPA on December 28, 1989 (EPA 1989). The ROD for OU1 required implementing an interim action concurrent with an ongoing RI/FS. Cleanup levels were not established in the ROD, since this expedited response action to remove sludge was carried out in advance of the RI/FS.

The remedial action objectives (RAOs) for OU1 were to effectively reduce risk to human health and the environment and to ensure that contaminants were not transported to groundwater, surface water, and/or air. The remedy selected in the ROD for OU1 consisted of an interim action to remove sludge as a source material, and included the following activities:

- Excavation and removal of approximately 110,000 cubic yards of solids.
- Partial solidification of the sludge using Portland cement.
- Construction of a monocell at Finley Buttes Landfill, an off-site, permitted solid waste facility.
- Transportation of the solidified sludge to Finley Buttes Landfill and disposal in the monocell.
- Long-term operation and maintenance of the off-site monocell.

Status of Implementation

On February 14, 1991, EPA issued a Unilateral Order to Wah Chang for design and implementation of the selected remedy for the Sludge Ponds. Based on this order, excavated sludge was transported to the monocell at Finley Buttes Landfill in Boardman, Oregon. On June 30, 1993, EPA issued a Certification of Completion for the Sludge Ponds OU1 Remedial Action (RA) to Wah Chang (EPA 1993).

Operable Unit 2 – Groundwater and Sediments

Basis for Taking Action

OU2 addresses contamination in groundwater and sediment at the Site. The need for remedial action was based on risks to industrial workers, and use of groundwater by future workers at the main plant and potential future residents of the Farm Ponds Area. Contaminated groundwater beneath the site discharges to adjacent properties and adjacent surface water bodies including the Willamette River. Contaminated fill material can enter Truax Creek through slope erosion and surface water bodies adjacent to or flowing through the Site to the local ecosystem. PCBs in the sediments of Truax Creek pose the greatest risk to fish and mammals. Agricultural exposures were considered for the SAA and adjoining land to the northeast and northwest of the Farm Ponds Area (EPA 1994).

The remedial actions selected in the ROD for OU2 were selected to deal with sources of groundwater and sediment contamination, and identified contamination in groundwater and sediment at the facility that was caused by past practices. Groundwater beneath the Site is contaminated with metals, volatile organic compounds (VOCs), polychlorinated biphenyls (PCBs), and radionuclides. Groundwater beneath some areas of the Site is very acidic. Sediments are contaminated with PCBs.

Response Actions

EPA selected the Final Remedial Action for OU2 in a June 10, 1994 ROD (EPA 1994). The ROD for OU2 identified the following contaminants of concern (COCs) and cleanup levels for groundwater (Table 1). The ROD for OU2 identified total PCBs as the COC for sediments the site, with a cleanup level established at 1 mg/kg.

Table 1. COCs and Groundwater Cleanup Levels from Table 10-1 of the ROD

COCs	Chemical Classification	Cleanup Level (µg/L)	Basis
Benzene	VOC	5	MCL
1,2-Dichloroethane (DCA)	VOC	5	MCL
1,1-Dichloroethene (DCE)	VOC	7	MCL
Methyl isobutyl ketone (MIBK)	VOC	5,000	HI=1
1,1,2,2-Tetrachloroethane	VOC	0.175	10-6
Tetrachloroethene (PCE)	VOC	5	MCL
1,1,1-Trichloroethane (TCA)	VOC	200	MCL
1,1,2-Trichloroethane (1,1,2-TCA)	VOC	3	Non-zero MCLG
Trichloroethene (TCE)	VOC	5	MCL
Vinyl Chloride (VC)	VOC	2	MCL
Hexachlorobenzene	SVOC	1	MCL
Bis(2ethylhexyl)phthalate	SVOC	0.2	MCL
Total PCBs	SVOC	0.5	MCL
Beryllium	Metal	4	MCL
Copper	Metal	1,000	SMCL
Manganese	Metal	50	SMCL
Uranium	Metal	30	MCL
Radium-226	Radionuclide	5	MCL
Radium-228	Radionuclide	5	MCL
Ammonium	Inorganic	250,000	OAR 333-61-030
Fluoride	Inorganic	2,000	OAR 333-61-030
Nitrate	Inorganic	10,000	MCL

Notes:

µg/L = micrograms per liter
COCs = Contaminants of Concern
MCL = Maximum Contaminant Limit
MCLG = Maximum Contaminant Limit Goal
HI = Hazard Index
OAR = Oregon Administrative Rule
SMCL = Secondary Maximum Contaminant Limit
SVOC = Semivolatile organic compound
VOC = Volatile organic compound

The following RAOs were established in the ROD (EPA 1994) for groundwater, sediment, and surface water in OU2.

Groundwater:

- Prevent people from drinking groundwater containing contaminant levels above federal or state drinking water standards.
- Prevent contaminated groundwater above federal or state drinking water standards from leaving the TWC property boundary.
- Reduce the concentrations of TWC-related organic, inorganic, or radionuclide compounds in groundwater to concentrations below federal or state drinking water standards or other risk based levels.
- Prevent groundwater containing TWC-related organic, inorganic, or radionuclide compounds above federal or state standards from discharging into nearby surface water.

Sediments:

- Prevent TWC-related contaminants from moving into sediments, and from sediments into surface water.

- Prevent sediments containing TWC-related contaminants from leaving the site.

- Prevent aquatic organisms from contacting contaminated sediments.

- Reduce concentrations of TWC-related compounds in sediments where necessary, to protect aquatic organisms.

Surface Water:

- Ensure that non-permitted discharges to surface water from the TWC facility do not exceed federal or state water quality standards. [*Note: Per 1996 Scope of Work for RD/RA (EPA 1996a) no groundwater discharge to surface water will occur that causes exceedances of the Ambient Water Quality Criteria (AWQC) for aquatic organisms].*

The selected RAs for OU2, identified in the ROD, consisted of the actions listed below with modifications defined in three Explanation of Significant Differences (ESDs) issued on October 8, 1996 (EPA 1996b), June 19, 2009 (EPA 2009), and April 25, 2013 (EPA 2013).

Groundwater Remedial Actions

- Extraction and treatment of contaminated groundwater.

  - EPA dropped the requirement for groundwater extraction at and outside the plant boundaries on the northern and western perimeters contingent on including placing deed restrictions on adjacent property on the western perimeter to preclude groundwater use for drinking water (EPA 1996b).

  - EPA selected a secondary treatment technology consisting of Enhanced In Situ Bioaugmentation (EISB) in the ASA to meet RAOs (EPA 2009).

  - EPA approved implementation of buffering solution injection in the FMA to enhance remediation (EPA 2013).

- Preventing off site migration of contaminated groundwater (off the Main Plant Site or beyond the current boundary of the groundwater contaminant plume at the Farm Ponds Area).

- Treatment or removal of subsurface source material near the Feed Makeup Building at the Main Plant.

Sediment Remedial Actions

- Slope erosion protection along the banks of Truax Creek to prevent contaminated fill material from entering the creek.

- Removal of 3,600 cubic yards of contaminated sediments from surface water bodies adjacent to or flowing through the site.

Sitewide Actions

- Deed restrictions and institutional controls (ICs) on land and groundwater use for both the Main Plant and the Farm Ponds Area.

- Environmental evaluations of currently uncharacterized potentially contaminated source areas as needed to ensure achievement of groundwater RAOs.

- Long-term on- and off-site groundwater, surface water, and sediment monitoring.

Status of Implementation

Groundwater Remedial Actions – Wah Chang implemented a Groundwater Extraction and Treatment System (GETS) in the Fabrication and Extraction Areas as an element of the remedy to achieve groundwater RAOs and cleanup levels.

- One extraction system was started in 2001 in the Fabrication area, and it is currently operating with five of the original six extraction wells, FW-1, FW-2, FW-3, FW-4, FW-5, and FW-7 (Figure 3).

- Two GETS were installed in the Extraction Area.

    - In 2000, the extraction system in the SEA was started with extraction wells EW-4, EW-5, and EW-6, EPA approved suspending operation of the SEA extraction wells in 2011. However, the VOC source area was not identified and Wah Chang was required to monitor wells in the SEA biannually for VOCs for a period of at least 5 years from the shutdown of extraction wells to determine if rebound occurs.

    - In 2002 a system was started in the FMA also consisting of three extraction wells: EW-1, EW-2, and EW-3. The system in the FMA is still operating.

Groundwater extraction will continue until cleanup levels are achieved at the point of compliance. EPA established the point of compliance at the Main Plant property boundary and for the Farm Ponds Area, the edge of the Farm Ponds themselves. The projected time frame for extraction is an estimated 15-year period beginning with the implementation of GETS in 2002. Under this performance standard, it was expected that cleanup levels at the site would be obtained in approximately 2017, though at the time this FYR was prepared, the cleanup levels had not been achieved. Several EPA approved modifications have been completed to GETS to enhance groundwater extraction and treatment including:

- Augmentation by EISB.

- Injection of buffer solution to assist with pH adjustment and reduction of groundwater COCs in the FMA.

- Removed of 500 cubic yards of soil from the ASA. Due to access restrictions, complete removal of the source was not feasible, and a chemical oxidant was placed into the excavation to provide further treatment of contaminants left in place.

- Installation of five new wells in the Farm Ponds Area to further refine groundwater flow direction and VOC distribution.

Sediment Remedial Actions – In 1997, sediment RAs were implemented that included removal of approximately 3,600 cubic yards contaminated sediments in Truax Creek, and application of geotextile to the creek bank to stabilize remaining contaminated soil. In 2002 sediment confirmation sampling was completed to ensure that the sediment remediation and bank stabilization were effective. Analytical results did not indicate any PCB detections in Truax Creek sediment (CH2M Hill 2002).

Sitewide Actions

- Deed restrictions and ICs were implemented as presented in Table 2.
- Environmental Evaluations of Uninvestigated Areas occur whenever Wah Chang discontinues the use of, paves, or otherwise disturbs any pond, plant area, or building on the site (EPA 1994).
- Long-term monitoring continues and consists of sampling and analyzing groundwater from the Extraction Area, Fabrication Area, Solids Area, and Farm Ponds Area; and surface water from Truax and Murder Creeks (ATI 2016a).

Operable Unit 3 – Surface and Subsurface Soil

Basis for Taking Action

OU3 addresses the contamination in surface and subsurface soils. Surface and subsurface soils are contaminated with PCBs and radionuclides as well as other contaminants. The decay products of the radionuclides, gamma radiation and radon, are also present on the Site. Risks from exposure to chemical and radionuclide contamination (excluding gamma radiation and radon) were generally low (EPA 1995).

EPA determined in the ROD that the industrial scenario was most appropriate for determining the need for remedial action on the Main Plant, and the industrial and farm worker scenarios were the most appropriate for determining the need for remedial action for the soil Amendment Area.

Response Actions

EPA selected the Final Remedial Action for OU3 in a September 27, 1995 ROD (EPA 1995). This section discusses RAOs and remedy selection, and implementation of RAs for OU3.

Following the risk assessment, the cleanup levels were established for surface gamma radiation in certain areas on the main plant, and for radon on the Main Plant and the SAA. The established cleanup levels were a gamma radiation exposure level of 20 micro-roentgen (μrem)/hour above background. The indoor radon concentration of 4 picocuries (pCi)/liter is the selected action level. Action is required where measured levels, or appropriate modeling predicting radon concentration on in future buildings, exceeds this level. A soil radium-226 concentration greater than 3 pCi/gram could result in a radon concentration in future buildings exceeding the 4 pCi/liter rdon action level.

Original site RAOs for soil in OU3 are as follows:

- Reduce the exposure to radon that would occur in future buildings constructed on the Main Plant and the SAA. Reduce surface gamma radiation exposure to acceptable levels (based on current risk assumptions, this level is 20 μrem/hour above background).
- Ensure that areas where surface and subsurface chemical risks are acceptable based on industrial or agricultural use are not used for other purposes, and that proper handling and disposal of soil occurs when it is disturbed.
- Provide easily accessible information on the locations of the material for TWC plant workers, future site purchasers, or regulatory agencies, where there are areas with subsurface contamination. This includes the PCB contamination in the Fabrication Area, and the residual radionuclide contamination in the Fabrication Area and Extraction Area.

The EPA-selected remedy combined source removal with ICs to reduce risk to human health and the environment posed by contamination in surface and subsurface soils at the site. Remedial actions include:

- Excavation of contaminated material exceeding the gamma radiation action level of 20 μrem/hour above background levels. Transportation of the excavated material to an appropriate off-site facility for disposal.
- For areas of the site where modeling indicates that radon concentrations in future buildings could exceed 4 pCi/liter, ICs requiring that future buildings be constructed using radon resistant construction methods.
- Requirement that information on areas of subsurface PCB and radionuclide contamination which do not pose a risk if they are not disturbed, be incorporated into the Wah Chang facilities maintenance plan and be made available to future site purchasers or regulatory agencies.
- Because the determination that action is not required for certain areas of the site is based on scenarios which do not allow unrestricted use, should excavation occur as part of future development of the Main Plant or the SAA, excavated material must be properly handled and disposed of in accordance with federal and state laws.
- ICs requiring that land use remain consistent with current industrial zoning (See Table 2).

EPA amended the soil remedy with a September 28, 2001, ESD (EPA 2001a), which includes:

- Change 1: Wah Chang will conduct Final Site closure for radionuclides pursuant to Wah Chang's Oregon Radioactive Materials License (Broad Scope Naturally Occurring Radioactive Material License) and the Energy Facility Siting Council (EFSC) Administrative Rules, Chapter 345, Division 50.
- Change 2: Wah Chang will control on-site surface gamma emissions through in-place management of contamination. Prior to site decommissioning under Oregon Health Department (OHD) and EFSC, Wah Chang must keep surface gamma emissions below cleanup levels through in-place management under an EPA- and ODEQ-approved management plan, and additional excavation of contamination as part of on-going excavation occurring during on-site construction.
- Change 3: If the site is not decommissioned under OHD and EFSC to EPA's cleanup requirements, radiation management shall be a condition of property transfer to ensure that these controls remain protective. Any partial or complete property transfer by Wah Chang shall be conditioned on implementation and maintenance of an appropriate EPA- and ODEQ-approved radiation management program.
- Change 4: Excavation and either engineered berms or off-site disposal are acceptable remedies for the SAA if ICs cannot be implemented.

Status of Implementation

Schmidt Lake – The Schmidt Lake Excavation Project was conducted in December 1992 to remove 2,016 cubic yards of materials containing zircon sands with elevated levels of thorium and uranium. The material was transported to the US Ecology low-level radioactive waste site in Washington for disposal. In 1998, an additional 12 to 15 cubic yards of soil where surface gamma radiation exceeded the site cleanup level of 20 μrem/hour above background levels were removed from Schmidt Lake.

Sand Unloading Area – In 1997, excavation was conducted in the Sand Unloading Area where surface gamma radiation levels exceeded the cleanup level of 20 μrem/hour above background. Excavation ceased when the northwestern edge of the material appeared to extend beneath a concrete slab in front of the mobile maintenance shop and under the shop itself, and when the northernmost end of the excavation would have interfered with on-site traffic with no evidence that the limit of contamination had been reached. The 1,890 cubic yards of soil excavated was disposed at a permitted low-level radioactive waste facility. Most of the Sand Unloading Area is now overlain by Wah Chang's natural gas–powered electricity-generating Co-Generation (CoGen) Plant, constructed in 2001. The plant is built on a 14-inch-thick concrete slab, which acts as an effective gamma-blocking barrier.

Front Parking Lot Area – Wah Chang removed low-level, radioactive titanium dioxide sand from the Front Parking Lot Area. Samples of the sand indicated that radium-226 levels could cause radon concentrations in future buildings to exceed the action level of 4 pCi/L, thus requiring future buildings to be constructed with radon-resistant construction methods.

Soil Amendment Area – Wah Chang obtained ODEQ solid waste permits in 1975 and 1976 for one-time applications of solids from the primary wastewater treatment plant. These were experimental soil amendments on the 40-acre SAA. The solids contained low levels of metals, radionuclides, and organic compounds. The RI/FS subsequently indicated that the radionuclide contamination in the SAA could result in an unacceptable risk from radon inhalation in any future buildings constructed on this area, and that organic compounds are above levels that would allow unrestricted use of the property. Between March 1989 and 1990, the SAA was transferred to the City of Millersburg through a deed agreement between the TWC Company and the City. The City acquired the 40-acre SAA, and TWC acquired property contiguous to its Farm Ponds Area. During the last FYR, EPA required an evaluation of risks to agricultural workers from soil resuspension due to tilling.
ICs requiring that land use remain consistent with current industrial zoning are currently in place (Table 2).

IC Summary Table

Table 2 presents the ICs implemented across the site.

Table 2: Summary of Planned and/or Implemented ICs

Media, engineered controls, and areas that do not support UU/UE based on current conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date (or planned)
Sludge	Yes	Yes	Finley Buttes Landfill	Long term assurance that risks associated with contaminant migration from waste from OU1 will be minimal.	ODEQ Oregon Title V Operating Permit 25-0001-TV-01
Soil and Groundwater	Yes	Yes	Main Plant and Solids Area	Restrict access to portions of the affected groundwater which remain above cleanup levels to ensure that the property and groundwater are used only for purposes appropriate to the cleanup levels achieved.	Restrictive Covenants (April 18, 1991)
Soil and Groundwater	Yes	Yes	Solids Area	Prohibit residential and agricultural uses	Restrictive Covenants (April 18, 1991)
Soil	Yes	Yes	Main Plant	Prevent potential radon exposure	Plant Standards established and implemented by Wah Chang

Table 2: Summary of Planned and/or Implemented ICs

Media, engineered controls, and areas that do not support UU/UE based on current conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date (or planned)
Soil and Groundwater	Yes	Yes	Main Plant and Farm Ponds Areas	Deed restrictions and ICs on land and groundwater use for both the main plant and Farm Ponds Area to ensure that the property and groundwater are used only for purposes appropriate to the cleanup levels achieved.	Deed Restriction (May 8, 1990) Check zoning Restrictive Covenant (April 18, 1991)
Groundwater	Yes	Yes	BNSF Railroad Company	Prevent installation or use of groundwater supply wells	Easement Agreement (April 9, 1999)
Groundwater	Yes	Yes	Simpson Timber Company	Prevent installation or use of groundwater supply wells	Equitable Servitude and Easement Agreement (November, 1998)
Groundwater	Yes	Yes	City of Albany	Prevents use of groundwater for potable purposes	Development Code Restrictions (Public Improvements 12.410)
Soil	Yes	Yes	City of Millersburg	Prohibits residential development in the Soil Amendment Area, and requires radon resistant construction methods and testing. Prevents use of groundwater for potable purposes	Environmental Protection Easement and Equitable Servitude Agreement (re-recorded December 14, 2007). The City of Millersburg Land Use Development Code Section 7.500
Soil	Yes	Yes	Main Plant	Establish protectiveness controls for radioactive materials remaining in areas by requiring decontamination to release the site for unrestricted use upon permanently discontinuing manufacturing activities.	Broad Scope Radioactive Materials License (#ORE-90001) for the facility.

III. PROGRESS SINCE THE LAST REVIEW

This section includes the protectiveness determinations and statements from the Fourth FYR (Table 3) as well as the recommendations from the last FYR and the current status of those recommendations (Tables 4 and 5).

Table 3: Protectiveness Determinations/Statements from the Fourth FYR

OU #	Protectiveness Determination	Site
OU1	Protective	The remedy for OU1 is protective of human health and the environment, and exposure pathways that could result in unacceptable risks are being controlled.
OU2	Short-term Protective	The remedy at OU2 is currently protective of human health and the environment in the short term. Progress to meet the groundwater RAOs is being made through an operating GETS enhanced with EISB. ICs are in place preventing exposure to COCs above cleanup goals through on-site and off-site deed restrictions on groundwater use, zoning, and access controls. In order for the remedy to be considered protective in the long term, Wah Chang must obtain and provide to EPA further information on groundwater pH conditions and COC concentrations, and verify that all ICs instruments required by EPA's decision documents are in place. Long term protectiveness will be obtained when Wah Chang and EPA take the actions described below: • Wah Chang must implement buffer solution treatment under EPA oversight to the groundwater source area contamination in the FMA stemming from acidic pH conditions and resulting in concentrations of COCs that remain above ROD cleanup levels. Groundwater quality conditions in the FMA are unlikely to achieve RAOs within the estimated 15-year time frame. EPA will evaluate the effectiveness of additional RAs in the FMA as data become available. EPA expects this action to be completed and data available to assess effectiveness in 2016. • Since Wah Chang's annual progress summaries and EPA's independent review of Wah Chang's data indicate that no VOCs have been detected in groundwater in the SEA and that ROD cleanup levels have been met, EPA considers the SEA protective in the short term. EPA-required ICs are in place at the site for use of groundwater, and the site is still zoned for General Industrial use by the City of Millersburg. Long term protectiveness will require Wah Chang under EPA oversight to assess the mobilization of solvents from the source area after oxygen has stopped the reductive dechlorination of dissolved chlorinated solvents. This assessment will consist of long-term ground-water monitoring. EPA will reassess the effectiveness of EISB in the SEA based on Wah Chang's groundwater monitoring data that will be submitted annually through 2016. • EPA has determined that due to elevated concentrations of VOCs in the ASA and Former Crucible Cleaning Area (FCCA), Wah Chang must continue to monitor geochemical conditions to evaluate the effectiveness of EISB and reductive dechlorination. In 2014, EPA will reassess the effectiveness of the EISB based on the groundwater data collected by Wah Chang and will make a decision whether the remedy will meet ROD cleanup levels in the 15-year time frame specified in the ROD or whether additional treatment will be required. However, Wah Chang's release of dense non-aqueous phase liquid (DNAPL) and/or high

Table 3: Protectiveness Determinations/Statements from the Fourth FYR

OU #	Protectiveness Determination	Site
		concentrations of VOCs in the ASA is an additional source area not encountered during the RI/FS that will likely require more aggressive remediation. Wah Chang must assess the source of DNAPL in the ASA and provide data to EPA by 2014. • EPA has observed increased concentrations of VOCs in well PW-78A (close to Murder Creek). The current downstream surface water sampling is located 200 feet from the anticipated discharge point of groundwater in the vicinity of this well. Under EPA oversight, Wah Chang must collect additional seepage and surface water samples in the vicinity of well PW-78A so EPA can evaluate the potential for release of contaminated groundwater to the creek. EPA expects to evaluate additional data by 2013. • Since the 2008 FYR, Wah Chang's annual progress summaries and EPA's independent review of Wah Chang's data showed increasing VOC concentrations in groundwater in the Farm Ponds Area indicating that ROD performance standards may not be met. However, EPA noted recent unexplained declines in concentrations. In 2012 Wah Chang completed excavation of the berm material that may have acted as a source of groundwater contamination, and collected confirmation samples of groundwater. EPA will evaluate the results of the completion report in 2013 to assess whether additional actions are required. • Wah Chang must conduct additional sampling and analysis of PCBs in sediments to ensure that the remedy for sediments is protective. EPA will evaluate additional data in 2013. • Wah Chang must submit a report to EPA documenting whether any of the wells being used for CERCLA site investigations were installed by Schoen Electric and Pump. If improperly constructed wells are being used, Wah Chang must prepare a work plan for EPA approval and replace these wells with wells that are compliant with well construction regulations. • Wah Chang must verify the status of deed restrictions requiring that land use at the site remain industrial, and whether deed restrictions for groundwater use and land use are in place for the properties Wah Chang recently purchased east of Old Salem Road. Wah Chang must also provide EPA with their site maintenance plan documenting areas of subsurface PCB and radionuclide contamination.
OU3	Protectiveness Deferred	A protectiveness determination of the remedy at OU3 cannot be made at this time until further information is obtained associated with exposure to radionuclides from resuspension due to tilling in the SAA. Further information will be obtained by taking the following actions: • Under EPA oversight, Wah Chang must collect samples of Soil Amendment soil and test for radiological contamination by the end of calendar year 2013 so EPA can reevaluate in 2014 the risk to human health and the environment from the disturbance/resuspension of soil to evaluate whether human health and the environment are protected under the existing remedy. Excavation of contaminated soil was completed and ICs are in place in the form of deed restrictions that prevent human exposure to remaining soils in the main plant of the site. Additionally, for the remedy to be protective in the long term, EPA and Wah Chang need to take the following actions to ensure protectiveness:

Table 3: Protectiveness Determinations/Statements from the Fourth FYR

OU #	Protectiveness Determination	Site
		• Prior to plant decommissioning, EPA and ODEQ will amend the Statement of Work of the 1996 Consent Decree to incorporate applicable requirements of the 2001 Soil ESD for plant decommissioning. • Under EPA oversight, Wah Chang must retest for radon in the CoGen Building by the end of calendar year 2013 due to uncertainty in the location of the CoGen Building with respect to the overall soil radiation footprint remaining after Wah Chang's remediation of the Sand Unloading Area. Based on the results, EPA may require additional testing of radon in indoor air or radon mitigation.
Sitewide Protectiveness	Protectiveness Deferred	EPA has determined that there is not enough information to evaluate protectiveness, primarily in the area of the site that has agricultural activities (SAA). Therefore, the sitewide protectiveness determination is deferred until the following additional information is evaluated. Wah Chang must collect and analyze soil samples for radium so EPA can reevaluate the risk to human health from the disturbance/resuspension of soil. Given that the earlier testing did not demonstrate human health risk, the City may continue to use the property for agricultural activities including tilling the soil although it is suggested by EPA that ground disturbing activities that may resuspend soil should be limited. Following EPA's reassessment of the contaminated soils, should there be an indication of human health risk to those exposed to these soils under current agricultural practices, EPA will share those results with the City of Millersburg and discuss appropriate actions for future use of the property. Progress to meet the groundwater RAOs is being made through an operating GETS enhanced with EISB. ICs are in place preventing exposure to COCs above cleanup goals through zoning ordinances and access controls and on-site and off-site deed restrictions on groundwater use. In order to ensure long term protectiveness, Wah Chang must provide further information on pH conditions and groundwater COC concentrations following remedy enhancements so that EPA can evaluate the ability of the OU2 remedy to meet RAOs within the 15-year time frame specified in the ROD, which would be this year. In addition, Wah Chang must confirm that all IC instruments required by EPA's decision documents are in place for all parcels of property that could be affected by contaminated groundwater. Wah Chang must verify the status of deed restrictions requiring that land use at the site remain industrial, and whether deed restrictions for groundwater use and land use are in place for the properties Wah Chang purchased east of Old Salem Road. Wah Chang must also provide EPA with their site maintenance plan documenting areas of subsurface PCB and radionuclide contamination. EPA Required ICs are in place requiring that anyone constructing future buildings on the Teledyne Wah Chang Main Plant must conduct an assessment to determine whether radon levels could pose an unacceptable risk to building occupants and implement radon resistant construction and controls and radon testing if required. Since the CoGen building was not constructed using radon resistant construction methods and is located in an area where residual radioactive contamination may exist, Wah Chang must resample indoor air radon in this building to ensure long term protectiveness of human health, and depending on the results, EPA may require additional sampling and radon mitigation.

Status of Recommendations from the Fourth FYR for OU1

There were no issues or recommendations for OU1 stated in the last FYR.

Status of Recommendations from the Fourth FYR for OU2

Issues and recommendations from the last FYR for OU2 are described in Table 4 along with the current status of those recommendations.

Table 4: Status of Recommendations from the Fourth FYR for OU2

OU 2	Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
1	Low pH conditions persist that contribute to COCs above ROD cleanup levels. Unlikely the ROD cleanup levels will be achieved by 2017 without using different technology.	Evaluate flushing groundwater with a basic solution (lime) to raise pH and decrease mobility of inorganic constituents. ESD anticipated by end of 2013 based on TWC treatability study.	Ongoing	An ESD was issued since the last review and flushing with a buffering solution occurred in the FMA. Trends from wells PW-52A, PQ-102A, PW-28A, PW-50A, EW-1, and EW-2 are inconsistent.	
2	Extraction Area – Although a source was never determined, Wah Chang implemented EISB as a pilot project under EPA oversight and VOCs were not detected in the SEA in 2011. Following EPA approval, Wah Chang shut down extraction wells in April 2011. The groundwater data needs to be assessed for potential reestablishment of a dissolved plume.	Wah Chang must continue to monitor groundwater biannually under EPA oversight for 5 years following shutdown of extraction wells in the SEA in 2011 to assess whether the dissolved plume is reestablishing itself.	Completed	The fifth year of monitoring is complete. The only ROD cleanup level exceedances for VOCs in the SEA monitoring well network were in well PW-96A (TCE and VC in 2014, and VC in 2013). There were no ROD cleanup level exceedances in the two sampling events since 2014, however VC in Well PW-96A was detected at 1.98 µg/L in Spring 2016, just below the cleanup level of 2.0 µg/L. The remaining wells did not exhibit any exceedances within the FYR period. A review of the results indicated that reductive dechlorination processes are still active in the SEA, as verified by the presence of ethanes measured at the Site.	12/28/2016
3	Fabrication Area – Wah Chang implemented EISB in the FCCA and EPA is currently evaluating its effectiveness.	Wah Chang must continue additional performance monitoring to determine if cleanup levels will be achieved by 2017, which is the time frame specified in the ROD.	Completed	Cleanup levels have not been achieved in the required timeframe.	

Table 4: Status of Recommendations from the Fourth FYR for OU2

OU 2	Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
4	Fabrication Area -Wah Chang implemented EISB in the ASA in 2009 and EPA is currently evaluating its effectiveness. However, Wah Chang's release of DNAPL and/or high chemical concentrations in the ASA is an additional source area not encountered during the RI/FS, and it is unlikely that ROD cleanup levels will be achieved in the 15-year time frame without additional RAs.	Wah Chang must continue additional performance monitoring to determine if ROD cleanup levels will be achieved. Treatment of the plume is successfully reducing dissolved phase chlorinated solvents. However geochemical evidence in the form of high dissolved concentrations in the source area indicate a DNAPL source remains that will require removal or more aggressive treatment.	Ongoing	Ongoing performance monitoring at the ASA indicates continuing VOC concentrations exceeding the ROD cleanup levels in wells in and downgradient of the ASA. Excavation activities to remove the potential DNAPL source area were completed in 2016. Some of the source area was unable to be removed. Post removal sampling of groundwater will continue.	
5	Farm Ponds Area – Based on Wah Chang's annual groundwater progress summaries and an independent review of Wah Chang's data, EPA noted that VOCs significantly and unexpectedly decreased to below ROD cleanup levels and was concerned about possible plume migration. In 2012, Wah Chang removed potential source material with EPA oversight since the drop in concentrations was unexplained.	Wah Chang excavated and removed the potentially contaminated berms and collected groundwater samples to confirm groundwater conditions. EPA expects to review these data in 2013 to determine whether the extent of the dissolved plume requires additional assessment.	Ongoing	Five new wells were installed at the Farm Ponds Area. Well PW-104S replaced Well SS and Well PW-108A replaced Well SD. Three downgradient wells were also installed (PW-105S, PW-106S, and PW-107S). These new wells were sampled along with existing wells at the Farm Ponds Area for the Sitewide Sampling Event in Spring 2016. Exceedances of VOC cleanup levels were present in well PW-104S. Extent of the dissolved plume was not evaluated in the Sitewide Monitoring Report.	
6	Wah Chang's method reporting limits for some VOCs (PCE and VC) in surface water samples exceed the AWQC.	Wah Chang must reduce the method reporting limits for PCE and VC in surface water samples to enable identification of COCs in surface water.	Completed	Surface water monitoring criteria have been confirmed as the Federal Ambient Water Quality Criteria for Aquatic Life. Laboratory methods used since the last FYR are able to measure chemicals below these levels of concern.	

Table 4: Status of Recommendations from the Fourth FYR for OU2

OU 2	Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
7	Ground-water monitoring constituents have been reduced over time since the RI/FS. Contaminants may have migrated over this time period and monitoring points should be reassessed.	Wah Chang must submit a work plan to EPA in 2013 and conduct a round of sitewide sampling for wells and parameters included in the original RI/FS using current analytical technology.	Completed	A Sitewide Groundwater and Surface Water Sampling event was conducted in 2016. An analysis of the data is expected in 2017.	3/31/2017
8	During decommissioning of well SS in the Farm Ponds Area, Wah Chang discovered the well was not properly constructed. The contractor that installed well SS, Schoen Electric and Pump, also installed other site wells.	Wah Chang must submit a report to EPA documenting whether any of the wells being used for CERCLA site investigations were installed by Schoen Electric and Pump. If improperly constructed wells are being used, Wah Chang must prepare a work plan for EPA approval and replace these wells with wells are compliant with well construction regulations.	Completed	After well SS was decommissioned in September 2012, well SD was identified in a groundwater summary report as the only well installed by Schoen Electric and Pump that was currently part of a CERCLA monitoring program. The Farm Ponds Area Phase 2 Work Plan and subsequent Phase 2 Well Installations Report summarized the decommissioning of well SS and well SD and installation of replacement wells PW-104S and PW-108A, respectively. The replacement wells were installed in 2015 and have been sampled once since.	3/29/2016
9	EPA has determined that Wah Chang needs to provide additional information on the status of the IC instruments to verify that all ICs required by EPA's decision documents are in place.	Wah Chang must verify the status of deed restrictions requiring that land use at the site remain industrial, and whether deed restrictions for groundwater use and land use are in place for the properties Wah Chang recently purchased east of Old Salem Road. Wah Chang must also provide EPA with their site maintenance plan documenting areas of subsurface PCB and radionuclide contamination.	Completed	Wah Change has electronic Plant Standards documenting excavation procedures and requirements which was observed during the site visit. Deed dated February 1, 2016 has restrictive covenant prohibiting construction, installation, or use of any wells on the site for human consumption or irrigation of food and crops.	2/1/2016
10	Surface Water – EPA noted from Wah Chang's annual	Wah Chang must add surface water sample locations in the	Under Discussion	Murder Creek surface water samples were collected in 2014 and 2015. In 2015, detections of 1,1,1-TCA	

Table 4: Status of Recommendations from the Fourth FYR for OU2

OU 2	Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
	progress summaries and an independent review of Wah Chang's data that VOCs have been detected in surface water at the site sporadically in past years. However, EPA believes that since the 2008 FYR, elevated concentration of VOCs observed in PW-78A may indicate migration of contaminated groundwater to Murder Creek.	vicinity of PW-78A in Murder Creek to evaluate the potential for contaminated groundwater to be released to surface water.		were below MCLs in the mid-stream sample location, which appears to be just upstream of PW-78A. Results from 2016 and during the last FYR indicated DCE concentrations in groundwater exceeded the ROD cleanup level in two of the five perimeter monitoring wells (PW-77A and PW-78A), and radium-226 and radium-228 concentration exceeded the ROD cleanup level in groundwater from PW-15AR during the 2016 sitewide monitoring event.	
11	Sediment – Additional information on PCB concentrations in sediment is needed to determine if the RA for sediment is functioning as intended.	Wah Chang must resubmit an appropriate Work Plan to EPA for approval and conduct sediment sampling and analysis in a manner consistent with the approved Work Plan.	Completed	A Sampling and Analysis Plan was submitted in 2014 with sampling performed in Truax Creek during August 2015.	11/20/2015

Status of Recommendations from the Fourth FYR for OU3

Issues and recommendations from the last FYR for OU3 are described in Table 5 along with the status of those recommendations.

Table 5: Status of Recommendations from the Fourth FYR for OU3

OU 3	Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
1	The Statement of Work and Consent Decree do not incorporate requirements of the 2001 Soil ESD regarding overall cleanup during decommissioning and other factors.	Prior to plant decommissioning, EPA and ODEQ will amend the Statement of Work of the 1997 Consent Decree to incorporate applicable requirements of the 2001 Soil ESD for plant decommissioning.	Completed	EPA determined this is not needed, since decommissioning is covered in Wah Chang's decommissioning license with the OHD.	

Table 5: Status of Recommendations from the Fourth FYR for OU3

OU 3	Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
2	The Mayor of Millersburg indicated that tilling for agricultural purposes was being conducted on the SAA. Although the RI/FS determined that agricultural practices did not pose a risk to human health or the environment, EPA is revisiting the issue since it has been 17 years since the soil radionuclide data were collected and the original evaluation did not address risks to agricultural workers from soil resuspension due to tilling.	Wah Chang must collect and analyze soil samples for radium by the end of calendar year 2013 so EPA can reevaluate the risk to human health and the environment from the disturbance/resuspension of soil and remaining levels of radionuclides in soils. Given that the earlier testing did not demonstrate human health risk, the City may continue to use the property for agricultural activities although it is suggested by EPA that ground disturbing activities that may resuspend soil should be limited. Following EPA's reassessment of the contaminated soils, should there be an indication of human health risk to those exposed to these soils under current agricultural practices, EPA will share those results with the City of Millersburg and discuss appropriate actions.	Addressed in Next FYR	A sampling plan was submitted and approved by EPA in 2016. However, to date, sampling has not been conducted. Sampling will occur when the field is next tilled. This is anticipated during 2017, depending on weather.	
3	There is uncertainty in the location of the CoGen Building with respect to the overall soil radiation footprint left behind after Wah Chang's RAs in the Sand Unloading Area. EPA ICs require that anyone constructing future buildings use radon-resistant construction methods if those buildings are located on top of radioactive contamination.	Wah Chang, under EPA oversight, must retest indoor air for radon in the CoGen Building by the end of calendar year 2013, and based on the results of radon concentrations, EPA may require further testing or actions.	Completed	Sampling was completed in 2014. Results did not indicate radon at concentrations of concern.	10/2/2015

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement & Site Interviews

A public notice was made available by mailing notices to the public mailing list on 2/7/2017, stating that a review of the Teledyne Wah Chang Superfund Site was underway, and inviting the public to submit any comments to the EPA. A copy of this notice is included in Appendix B. The results of the review and the report will be made available at the site information repository located at the EPA Region 10, Superfund Records Center, 1200 Sixth Avenue, Suite 900, CRC-161, Seattle, WA 98101. EPA received no comments or inquiries from the public.

During the FYR process, interviews were conducted to document any perceived problems or successes with the remedy that has been implemented to date. Interviews were conducted with the ODEQ, OHD, and the representatives of the City of Millersburg. Interview questionnaires are included as Appendix C. No concerns or issues were identified during the interview process.

Data Review

OU1 – Sludge Ponds

SCS Engineers conducts semiannual groundwater monitoring at the Finley Buttes Landfill monocell in Boardman, Oregon. Wells MW-4 and MW-5 are used to monitoring upgradient and downgradient groundwater conditions, respectively. The EPA conducted a review of the most recent annual report of landfill monitoring (SCS Engineers 2017) and confirmed that trace metal results were not detected in the landfill monitoring wells above the established concentration limits in 2016.

OU2 – Groundwater and Sediment

For OU2, since the last FYR, data was collected to monitor GETS operations, groundwater concentration trends, sediment, surface water, and uninvestigated areas. The following presents a summary of data and trends since the last FYR.

Groundwater Extraction Treatment System Operations
Wah Chang is responsible for the operation and maintenance of the groundwater extraction systems in operation at the Fabrication Area and the Extraction (FMA) area.

The GETS operating in the Fabrication Area includes five operational extraction wells: FW-1, FW-2, FW-3, FW-4, and FW-5 (Figure 3). Extracted groundwater from operating wells (excluding FW-5) is sent to the Wah Chang process water cooling tower, which functions as an air stripping tower to volatize the VOCs. FW-5 discharge is treated in the Wah Chang Ammonia Recovery System. Based on aquifer testing conducted in 2013 at extraction well FW-4 and monitoring well PW-30A, Wah Chang presented a work plan to install an extraction well in PW-30A (GSI 2016b). Wah Chang is planning to convert PW-30A to an extraction well that will operate in conjunction with FW-4. The objective for this system change is to improve onsite containment in this area of the facility. Available mass removal data since the last FYR are presented in the following table.

Table 6: Mass Removal from the Fabrication Area

	2012	2013	2014	2015	2016
Water Extracted (gallons)	14,537,786	12,517,977	15,823,533	11,747,556	11,420,853
VOCs removed (pounds)	31.1	13.7	8.1	18.0	27.1
Source: GSI 2016d, GSI 2015c, GSI 2015d					

The GETS operating in the FMA, within the Extraction Area, extracts groundwater from three extraction wells: EW-1, EW-2, and EW-3. Groundwater pumped from the GETS is treated and processed in the Central Wastewater Treatment System; then, the water is discharged to the Publicly Owned Treatment Works. These activities are conducted in compliance with the site Publicly Owned Treatment Works permit. Available mass removal data since the last FYR are presented in the following table.

Table 7: Mass Removal (pounds) in the Feed Makeup Area

	2012	2013	2014	2015	2016
Water Extracted (gallons)	410,383	231,484	177,694	215,559	144,455
Fluoride	7	3.9	2.97	3.6	2.5
Ammonia	167.25	83.95	53.60	98.24	NA
Radium 226	9.65×10^{-9}	4.34×10^{-9}	5.34×10^{-9}	1.27×10^{-8}	NA
Radium 228	1.47×10^{-6}	8.46×10^{-7}	2.95×10^{-6}	4.73×10^{-6}	NA
Total Dissolved Solids	7,754	3,158	1,452	1,699	1,197
Source: GSI 2016e, GSI 2015b, GSI 2015e, ATI 2016b, ATI 2016c, ATI 2016d NA Not available					

Groundwater Monitoring
EPA obtained data through Spring 2016 from Wah Chang (GSI 2017a) and conducted an independent review of the data as part of this FYR, including preparing summary tables, included at the end of this document. Included in this FYR are tables prepared by EPA, and figures that were supplied by Wah Chang to evaluate data trends and assess the protectiveness of the remedies implemented at the site. The data tables used for this review are presented in Appendix E, and are labelled as follows:

Fabrication Area:	Tables A-1 through A-10
Extraction Area, FMA:	Tables B-1 and B-2
Extraction Area, SEA:	Tables C-1 and C-2
Farm Ponds Area:	Tables D-1 through D-3
Solids Area:	Table E-1
Surface Water:	Table F-1

Data trend charts for a subset of wells and contaminants are presented in Appendix F. A general review of data groundwater data indicated the following:

- Groundwater in the Fabrication Area groundwater continues to have contaminant concentrations of numerous COCs in excess of the ROD cleanup levels, especially chlorinated VOCs in the ASA and the FCCA, and nitrates in the Ammonium Sulfate Storage Area.
- Fluoride and radium-226/228 concentrations in the FMA continue to exceed cleanup levels.
- Groundwater concentrations of all COCs in the SEA have remained below cleanup levels since Fall 2014.
- In the Farm Ponds Area, only groundwater from newly installed monitoring well PW-104S exhibited concentrations of COCs over the ROD cleanup levels.
- Groundwater results from the 2016 sitewide monitoring event in the Solids Area noted exceedances of some metals over the ROD cleanup level, including radium-226/228, total arsenic, total cyanide, and total manganese. Exceedances were not noted in wells routinely monitored.

A more detailed discussion of contaminant concentrations by area, since the last FYR, follows.

Fabrication Area

The groundwater monitoring network in the Fabrication Area includes wells grouped in specific areas of interest across the site; the ASA, Material Recycle Building, the Ammonium Sulfate Storage Building, the FCCA, and the Dump Master Building. The wells are further grouped into "Hot Spot Area Wells", "Non-Hot-Spot Area Wells", and "Perimeter Wells". Although the current concentrations may not correlate with the "hot spot" and "non-hot spot" designations, these historical names have been preserved for consistency with past documents. In addition to wells in the monitoring network, additional wells were sampled in 2016 as part of the 2016 sitewide monitoring event. Figures 7 and 8 show sitewide DCE and VC distributions, respectively. The following discussion presents trends over the last 5 years, focusing on the current (2016) monitoring data.

Acid Sump Area – Results of the 2016 sitewide sampling indicates the presence of TCE and other VOCs as well as nitrate and fluoride at concentrations above cleanup levels. Since the last FYR, there are no consistent trends for VOC hot-spot monitoring well concentrations of TCA, DCE, TCE, PCE, VC, and nitrate. Large fluctuations in concentrations have been observed. No trends for non-hotspot monitoring well exceedances are apparent for TCA, DCE, TCE, and VC, except for well PW-98A, where VOC concentration have been increasing since 2004. The 2016 sitewide sampling took place before the source area excavation, therefore the effectiveness of the source area remediation could not be evaluated. Figures F-1 through F-4 present changes in chemical concentrations over time for DCE, nitrate, TCE, and TCA in ASA hot spot wells.

Material Recycle Area – During the period from 2012 to 2016, exceedances of VOC ROD cleanup levels occurred only in the three hotspot wells and no consistent trends for DCE, TCE, and VC are apparent. No exceedances were reported in the last 5 years for VOCs in non-hotspot wells. Figures F-5 and F-6 present DCE and TCE concentrations over time in Material Recycle Area hot spot wells.

Ammonia Sulfate Storage Building – Since the last FYR, when concentrations in all the wells around the Ammonia Sulfate Storage Building were lower than or very close to the method reporting limits, concentrations of DCE, TCE, and VC have increased in some of the wells and exceeded the cleanup levels. Ammonium concentrations increased since the last FYR in some wells and exceeded the cleanup level in one well during Spring 2014, but not during Spring 2016. Figures F-7 and F-8 present changes in DCE and nitrate concentrations (respectively) over time in the Ammonium Sulfate Storage Building Area hot spot wells.

Former Crucible Cleaning Area – Results since the last FYR through the 2016 sitewide sampling event indicate trends of VOCs are inconsistent, both increasing and decreasing. Exceedances of the ROD cleanup levels for TCA, DCE, PCE, and VC occurred in hotspot wells. VOC concentrations in all non-hotspot wells were below cleanup levels. Figures F-9 and F-10 present changes in DCE and TCA concentrations (respectively) over time in the FCCA hot spot wells.

Dump Master Area – Exceedances of VOC ROD cleanup levels occurred only in the two hotspot wells and no consistent trends were observed for TCA or DCE in well PW-30A, or for VC in well PW-73B. No exceedances were reported in the last 5 years for non-hotspot wells and for VOCs TCE, DCA, and PCE. Figure F-11 presents DCE concentrations over time in the Dump Master Area hot spot wells.

East Perimeter Area – Contaminants appear to migrate off the Main Plant toward and into the area designated as the "East Perimeter Area", though the groundwater flow pattern in this area is not clear from available information. This former residential area is now owned by ATI. Results over the last five years show variable VOC concentrations, with numerous ROD cleanup level exceedances. In the wells sampled in 2016, without a historical record for comparison, DCE and VC were detected at concentrations above cleanup levels in only FW-7. Figure F-12 presents DCE concentrations over time in East Perimeter Area wells.

Northern Perimeter Wells - Murder Creek – Results from 2016 and during the last FYR indicated DCE concentrations in groundwater exceeded the ROD cleanup level in two of the five well monitoring wells (PW-77A and PW-78A). Though PW-15AR has not been sampled routinely, it was sampled during the 2016 sitewide monitoring event. During this event, radium-226 and radium-228 exceeded the ROD cleanup level in groundwater. Figure F-13 presents DCE concentrations over time in the Northern Perimeter wells.

Extraction Area

Extraction well and monitoring well locations for the Extraction Area are presented on Figure 2. Groundwater contamination in the FMA is characterized by the presence of metals, radionuclides, and low (acidic) pH levels. Groundwater contamination in the SEA is characterized by the presence of chlorinated solvents. The routinely monitored groundwater monitoring network in the Extraction Area is composed of 18 monitoring wells.

Feed Makeup Area – Both monitoring wells and extraction wells located in the FMA (Figure 2) were sampled in 2016. Groundwater concentrations of the following COCs exceeded the ROD cleanup levels in one or more wells in the most recent sampling event are noted: fluoride, cadmium, radium-226/228, arsenic, manganese, VC, and pentachlorophenol. Since the last FYR, the number of detections and concentrations of fluoride and radionuclides exceeding the ROD cleanup level in the FMA has increased in several wells, however, the concentrations over time have been variable and no strong trends are evident. Figure F-14 presents trends in radium concentrations in FMA wells since Fall 2012.

Groundwater pH ranged from 2.72 to 7.84. The perimeter wells and PW-51A were the only wells in the FMA that met the pH range of 6.5 to 8.5 required by the ROD. Since the last review, Wah Chang completed the FMA soil flushing project in June 2013 (EPA 2013). The flushing was intended to increase groundwater pH to reduce contaminant concentrations. This change was intended to reduce radium and metals in groundwater. As exhibited by pH levels measured in the GETS influent, pH increased from 1.89 in 2002 to 5.67 in 2013 (after completion of the soil flushing project). The pH level decreased in both 2014 (5.23) and 2015 (5.11) (GSI 2016e). Wah Chang has agreed to monitor PW-102A and PW-103A to support evaluation of the FMA (EPA 2016), but data was not available for inclusion in this FYR.

South Extraction Area – The EISB pilot project in the SEA lowered VOC concentrations to non-detections at all wells in 2011. Concentrations declined over time and in Spring 2015 and Spring 2016, no wells in the SEA monitoring well network exceeded ROD cleanup levels for VOCs.

Farm Ponds Area

Typically, the groundwater monitoring network in the Farm Ponds Area is composed of 19 monitoring wells. Thirty-two monitoring wells in the area were sampled during the 2016 sitewide monitoring event. The additional wells included the newly installed wells along the perimeter of the Farm Ponds Area, and wells that were sampled historically, but had not been sampled in a while. These wells cover a wider area than the groundwater monitoring network sampled regularly. Groundwater samples were tested for total and dissolved metals, VOCs, SVOCs, and radium-226/228, plus PCBs in one well only. Since the last FYR, until 2016, there were no exceedances of ROD cleanup levels. In 2016, only newly installed monitoring well PW-104S exhibited concentrations of VOCs over the ROD cleanup levels. The VOCs were 1,2-DCA (6.09 μg/L), TCE (19 μg/L), 1,1,2-TCA (12.2 μg/L), PCE (7.3 μg/L), and 1,1,2,2-tetrachloroethane (0.37 J μg/L).

In groundwater wells sampled only during the 2016 sitewide monitoring event, manganese was detected in most wells at concentrations exceeding the ROD cleanup level, and a single exceedance of arsenic was measured in groundwater in monitoring well PW-37A (21.1 μg/L) (GSI 2017a).

Solids Area

Typically, the groundwater monitoring network in the Solids Area is composed of 11 monitoring wells. Seventeen monitoring wells were sampled during the 2016 sitewide sampling event (Figure 4). Groundwater data results for manganese, fluoride, nitrate, radium-226/228, and chloride from 2003 to 2016 are provided in Table E-1. Since the Fourth FYR, and prior to the sitewide sampling event, the only contaminant that exceeded ROD cleanup levels was fluoride, in September 2012. Results of the 2016 sitewide sampling event noted exceedances of some metals over the ROD cleanup level, including radium-226/228, total arsenic, total cyanide, and total manganese.

Surface Water and Sediment

Wah Chang collects surface water samples in Murder and Truax Creeks to monitor discharge of contaminated groundwater from the Fabrication Area to the creeks. Samples are collected upstream and downstream of the facility (Figure 11). Table F-1 displays a historic summary of COC concentrations in surface water samples collected upstream and downstream along Murder Creek and Truax Creek, as well as a mid-stream location added in 2016.

Murder Creek – Since the 2012 FYR report, and as presented in Table F-1, VOCs were not detected in downstream surface water above the ROD cleanup levels.

Truax Creek – Since the Fourth FYR report and as presented in Table F-1, VOCs were not detected in downstream surface water above the ROD cleanup levels.

In August 2015, sediment samples were collected from Truax Creek and analyzed for PCBs in order to determine if PCB levels in Truax Creek remain below the remedial action cleanup level of 1 part per million and thus are protective of human health and the environment. Based on the sediment sampling results from 10 sampling stations located in Truax Creek, both within and outside of the facility, the 2015 sampling event confirmed that PCB levels in Truax Creek sediments remain below the remedial action cleanup level (Figure 12) (GSI 2015g).

Environmental Evaluations of Uninvestigated Areas

The ROD requires evaluation of areas not investigated during the RI/FS to ensure RAOs for groundwater at the site are being achieved. These evaluations are conducted at previously uninvestigated areas whenever they discontinue use of or otherwise disturb any pond, area, or building on the site to determine whether there have been releases of contaminants that have or may have the potential to affect groundwater quality. During this FYR period, Wah Chang field-screened excavated soil for potential contamination, and samples with positive detections were analyzed for toxicity characteristic leaching potential metals, VOCs, and SVOCs. While some excavated soil contained PCBs, no additional sources of groundwater contamination were identified, and none of the soil required special disposal (ATI 2014, 2016f).

OU3 – Surface and Subsurface Soils

Radon Sampling

The CoGen Building was built on top of the former Sand Unloading Area with no excavating or sampling prior to construction. Gamma surveys were performed to meet the ROD gamma radiation cleanup level; however, the ROD also requires demonstration that construction over residual contamination will not result in radon concentrations in indoor air above 4 pCi/L. During this FYR period, air samples were collected in Building 73 and Building 198. None of the radon testing results were found to exceed the 4.0 pCi/L action level set in the OU3 ROD (ATI 2015a).

Site Inspection

The inspection of the site was conducted on 3/14/2017. In attendance were Jil Frain, Phil Brown, and Sheena Styger of EA Engineering, Science, and Technology, Inc., PBC, contractor for EPA, Region 10, Noel Mak of ATI representing the RP, and Peter Pellegrin of GSI, contractor for ATI overseeing site monitoring activities. Greg Aitken of the ODEQ and Mike Riley of ATI attended the kick off meeting but did not attend the site walk. The purpose of the inspection was to assess the protectiveness of the remedy. A site inspection form is included in Appendix D.

At the kick off meeting, the purpose of the site visit was explained, and participants were asked to discuss issues or concerns regarding progress of the site cleanup. No issues were noted. The site visit included observations of the SEA treatment area, the FMA treatment area, Truax Creek, the soils storage area, Cell 3, Solids Area, river pump area, Murder Creek (and associated sampling locations), ASA, Materials Storage Area, and the Farm Ponds Area.

During the site inspection, extraction wells were observed operating as expected. Treatment systems appeared well maintained and spare parts were observed. Totalizers were functioning and metered treatment equipment was observed treating water prior to pumping for additional treatment. Inspection logs and site access control were observed.

Maintenance issues were noted with several of the flush-completed wells in the monitoring well system, specifically, the sealing of flush-completed wells in areas of high traffic. Due to heavy traffic, certain wells were observed with stripped threads on vaults or the bolts to seal the vaults, cracked vaults, missing gaskets, inoperable locks due to corrosion, and compromised well seals due to wear. Nearly all wells with above ground completions were found to be labeled, locked, capped and protected with yellow-painted barrier posts. Some locks were difficult to open. Inside the protective casing nearly all wells were found to have marked measurement points.

Upon return to the Plant office building, the Operation and Maintenance Manuals were reviewed. It was noted that the manuals had not been updated with recent system changes, and as-builts were not available. The Plant Standards were reviewed electronically. The excavation procedure was available and included required excavation controls and procedures to address potentially contaminated areas.

V. TECHNICAL ASSESSMENT

Technical Assessment of OU1

QUESTION A: Is the remedy functioning as intended by the decision documents?

EPA issued a Certification of Completion for OU1 RA to Wah Chang on June 30, 1993 (EPA 1993). The RA for OU1 is considered complete. A review of the most recent annual report of landfill monitoring (SCS Engineers 2017) and confirmed that trace metal results were not detected in the landfill monitoring wells above the established concentration limits in 2016.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

There are no changes to the exposure assumptions, toxicity data, cleanup levels, and RAOs that would bring the selected remedy into question.

QUESTION C: Has any other information come to light that could call into question the protectiveness of the remedy?

No additional information has come to light that would call into question the protectiveness of the remedy.

Technical Assessment of OU2

QUESTION A: Is the remedy functioning as intended by the decision documents?

EPA has determined that the remedy in OU2 is functioning as intended by the decision documents by prevention of exposure to site contaminants, however, the cleanup levels have not been met in the expected 15-year cleanup from the time of completion of GETS. Specific concerns identified during the data review include:

- Continued exceedances of the ROD cleanup levels for groundwater in the ASA, and residual source material identified and left in place after the 2016 removal action.
- Continued exceedances of the ROD cleanup levels for groundwater in the FCCA, and increases in TCE concentrations in groundwater from PW-94A.
- Concentrations of COCs continue to exceed ROD cleanup levels for groundwater in the FMA.
- The newly installed well in the Farm Ponds Area exceeds ROD cleanup levels for several COCs, and results from the 2016 sitewide monitoring event noted concentrations of manganese, cyanide, arsenic and radium-226/228 exceeded ROD cleanup levels in wells not currently in the monitoring program.
- Groundwater flow around the East Perimeter Area is not well defined, such that the impact of exceedances of the ROD cleanup levels in properties outside the plant boundary are not well understood.

Progress is being made toward cleanup, as noted below:

- The GETS is functioning; however, enhancements will be needed to accelerate cleanup.
- As discussed in the data review section, cleanup goals have been met in the SEA.
- No exceedances of cleanup levels were observed in non-hotspot wells in the Material Recycle Area, the Former Crucible Cleaning Area, and the Dump Master Area.
- Sampling of sediment in Truax Creek confirmed that the PCB bank remediation is still protective.
- Discharges to surface water from the site do not exceed federal or state water quality standards for aquatic receptors, however, there have been exceedance of MCLs in some of the Fabrication Area perimeter monitoring wells.

Based on Wah Chang's title search (Wah Chang 2012), EPA verified that deed restrictions on groundwater use are in place for the Main Plant and Farm Ponds Area. EPA verified that the site is zoned for General Industrial use by the City of Millersburg, and ODEQ and OHD (Appendix A) do not anticipate future changes in zoning. Deed restrictions prohibiting residential use are in place for the Solids Area (Wah Chang 2012). ICs have been implemented on the site, and interviews with ODEQ and OHD (Appendix A) indicated that the ICs are functioning as intended and there have been no changes in land use or zoning.

The 1996 ESD requires "deed restrictions or other ICs acceptable to EPA and ODEQ for all off-site properties where groundwater containing contaminants above cleanup levels is present." These deed restrictions and ICs are in place and protective for the OU2.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid?

There have been no physical changes to the site that would adversely affect the protectiveness of the remedy.

Since the last FYR, the Regional Screening Level for 1,1,2,2-tetrachloroethane has been reduced to 0.076 µg/L (EPA 2017), which is lower than the 0.175 µg/L chosen as a cleanup level in the ROD. Although this change could impact the cleanup level, this does not affect protectiveness since this COC is not typically detected at the site. There have been no changes to the toxicity factors to these chemicals in IRIS for the risk derived ROD cleanup levels, and no changes to MCLs.

The last FYR noted that the manganese human health water quality criterion has been removed, and the arsenic human health water quality criterion has been revised to 2.1 µg/L.

QUESTION C: Has any other information come to light that could call into question the protectiveness of the remedy?

No additional information has come to light that would call into question the protectiveness of the remedy.

<u>Technical Assessment of OU3</u>

QUESTION A: Is the remedy functioning as intended by the decision documents?

The remedy is functioning as intended by the decision documents. Final site closure for radionuclides will be conducted pursuant to Wah Chang's Oregon Radioactive Materials License and the EFSC Administrative Rules. This work will be conducted under the oversight of the OHD and in consultation with ODEQ and EPA. Currently, site safety is in place through Wah Chang's radiation management programs.

The SAA is currently being used for agriculture and ICs are in place for radon mitigation if future buildings are constructed on the property. Since it has been more than 20 years since the data were collected, EPA is requiring additional evaluation for radionuclides to ensure that tilling of soils or consumption of crops does not present risk to human health or the environment. There is uncertainty as to whether the current use of tilling the soil for agricultural purposes and the resulting soil resuspension were evaluated in the 1995 Radiological Survey Addendum. Activity based sampling in the SAA was not conducted as required by the last FYR.

None of the radon testing results collected during this FYR period from Buildings 73 and 198 were found to exceed the 4.0 pCi/L action level set in the OU3 ROD (ATI 2015a).

Deed restrictions prohibiting residential use are in place for the Solids Area and SAAs (Wah Chang 2012). Observations during the site inspection confirmed the site is adequately fenced including security cameras.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid?

There have been no changes to the exposure assumptions, toxicity data, cleanup levels, and RAOs that would affect the remedy for the soils OU since the last FYR.

QUESTION C: Has any other information come to light that could call into question the protectiveness of the remedy?

No additional information has come to light that would call into question the protectiveness of the remedy.

VI. ISSUES/RECOMMENDATIONS

Issues/Recommendations
OU(s) without Issues/Recommendations Identified in the Five-Year Review:
Operable Unit 1

Issues and Recommendations Identified in the Five-Year Review:				
OU(s): OU2	**Issue Category: Remedy Performance**			
	Issue: Wah Chang completed source removal and chemical oxidation treatment in the ASA in 2016. Since some source material was left in place, and current hot spots remain, the cleanup levels are not expected to be achieved by the time frame specified in the ROD.			
	Recommendation: Wah Chang must determine when and if ROD cleanup levels will be achieved, and determine whether additional response actions are needed in order to achieve ROD cleanup levels.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	12/28/2018
OU(s): OU2	**Issue Category: Remedy Performance**			
	Issue: Wah Chang implemented EISB in the FCCA and while there have been reductions in contaminant levels, the trends are inconsistent. Areas of contamination still exceed the ROD cleanup levels.			
	Recommendation: Wah Chang must evaluate groundwater monitoring data in the FCCA and recommend modifications to reduce contaminant concentration levels.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	12/28/2018

Issues and Recommendations Identified in the Five-Year Review (continued)				
OU(s): OU2	**Issue Category: Remedy Performance**			
	Issue: Low pH conditions persist in the FMA that contribute to COCs above ROD cleanup levels. ROD cleanup levels will not likely be achieved in 2017.			
	Recommendation: Wah Chang must evaluate GETS and the current soil flushing regime and improve effectiveness.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	12/28/2018
OU(s): OU2	**Issue Category: Monitoring**			
	Issue: Results from the 2016 sitewide monitoring event noted concentrations of manganese, cyanide, arsenic and radium-226/228, that exceeded ROD cleanup levels in wells not currently in the monitoring program. Of note are exceedances of radium 226/228 concentrations in groundwater from perimeter monitoring well PW-15AR			
	Recommendation: Exceedances must be evaluated to determine if additional wells need to be added to the monitoring program, and if further measures need to be taken to address the exceedances of the ROD cleanup levels.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
Yes	Yes	PRP	EPA	12/28/2018
OU(s): OU3	**Issue Category: Monitoring**			
	Issue: The last FYR noted that tilling for agricultural purposes was being conducted at the SAA. Although the RI/FS determined that agricultural practices did not pose a risk to human health or the environment, EPA is revisiting the issue since it has been more than 20 years since soil radionuclide data were collected and the original evaluation did not address risks to agricultural workers from soil resuspension due to tilling.			
	Recommendation: Wah Chang must collect and analyze air samples for radium at the next opportunity, to measure the risk to human health and the environment from the disturbance/resuspension of soil and remaining levels of radionuclides in soils. Since earlier testing did not demonstrate human health risk, the City may continue to use the property for agricultural activities. Following EPA's reassessment of the contaminated soils, should there be an indication of human health risk to those exposed to these soils under current agricultural practices, EPA will share those results with the City of Millersburg and discuss appropriate actions for future use of the property.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
Yes	Yes	PRP	EPA	12/28/2018

Other Findings

In addition, the following are recommendations that were identified during the FYR and may improve performance of the remedy, but do not affect current and/or future protectiveness:

- **Issue:** Farm Ponds Area – New wells were installed in the Farms Ponds area; however, an assessment of groundwater flow, including the new wells was not conducted and needs to be completed. Wah Chang shall remeasure water levels and create a contour map for this area and continue monitoring.

VII. PROTECTIVENESS STATEMENT

Protectiveness Statement(s)	
Operable Unit: OU1	*Protectiveness Determination:* Protective
Protectiveness Statement: The remedy for OU1 is protective of human health and the environment, and exposure pathways that could result in unacceptable risks are being controlled.	
Operable Unit: OU2	*Protectiveness Determination:* Short-term Protective
The remedy at OU 2 currently protects human health and the environment because ICs are in place preventing exposure to contaminants of concern above cleanup goals through on-site and off-site deed restrictions on groundwater use, zoning, and access controls, and the remedy is operating and making progress toward meeting the RAOs. However, for the remedy to be protective in the long-term, the following actions need to be taken to ensure protectiveness: • Wah Chang must determine when and if ROD cleanup levels will be achieved, and determine whether additional response actions are needed in order to achieve ROD cleanup levels. • Wah Chang must evaluate groundwater monitoring data in the FCCA and recommend modifications to reduce contaminant concentration levels. • Wah Chang must evaluate GETS and the current soil flushing regime and improve effectiveness. • Exceedances of cleanup levels identified during the 2016 sitewide monitoring event must be evaluated to determine if additional wells need to be added to the monitoring program, and if further measures need to be taken to address the exceedances of the ROD cleanup levels.	
Operable Unit: OU3	*Protectiveness Determination:* Short-term Protective
The remedy at OU 3 currently protects human health and the environment because ICs are in place preventing exposure to contaminants of concern above cleanup levels. However, in order for the remedy to be protective in the long-term, air samples shall be collected during tilling in the SAA to reassess remaining levels of radionuclides and determine the risk to human health and the environment from the disturbance of soil.	

Sitewide Protectiveness Statement
Protectiveness Determination: Short-term Protective
Protectiveness Statement: The site remedy currently protects human health and the environment because ICs are in place preventing exposure to contaminants of concern above cleanup goals through on-site and off-site deed restrictions on groundwater use, zoning, and access controls, and the remedy is operating and making progress toward meeting the RAOs. However, in order for the remedy to be protective in the long-term, Wah Chang must determine when and if ROD cleanup levels will be achieved, and determine whether additional response actions are needed in order to achieve ROD cleanup levels. Wah Chang must evaluate groundwater monitoring data in the FCCA and recommend modifications to reduce contaminant concentration levels, and must evaluate GETS and the current soil flushing regime to improve effectiveness. Exceedances of cleanup levels identified during the 2016 sitewide monitoring event must be evaluated to determine if additional wells need to be added to the monitoring program, and if further measures need to be taken to address the exceedances of the ROD cleanup levels. Exceedances in perimeter monitoring wells must be addressed. Activity based air samples shall be collected and analyzed during tilling in the SAA to reassess remaining levels of radionuclides and determine if there is a risk to human health and the environment from the disturbance of soil.

VIII. NEXT REVIEW

The next FYR for the Teledyne Wah Chang Superfund Site is required 5 years from the completion date of this review.

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FIGURES

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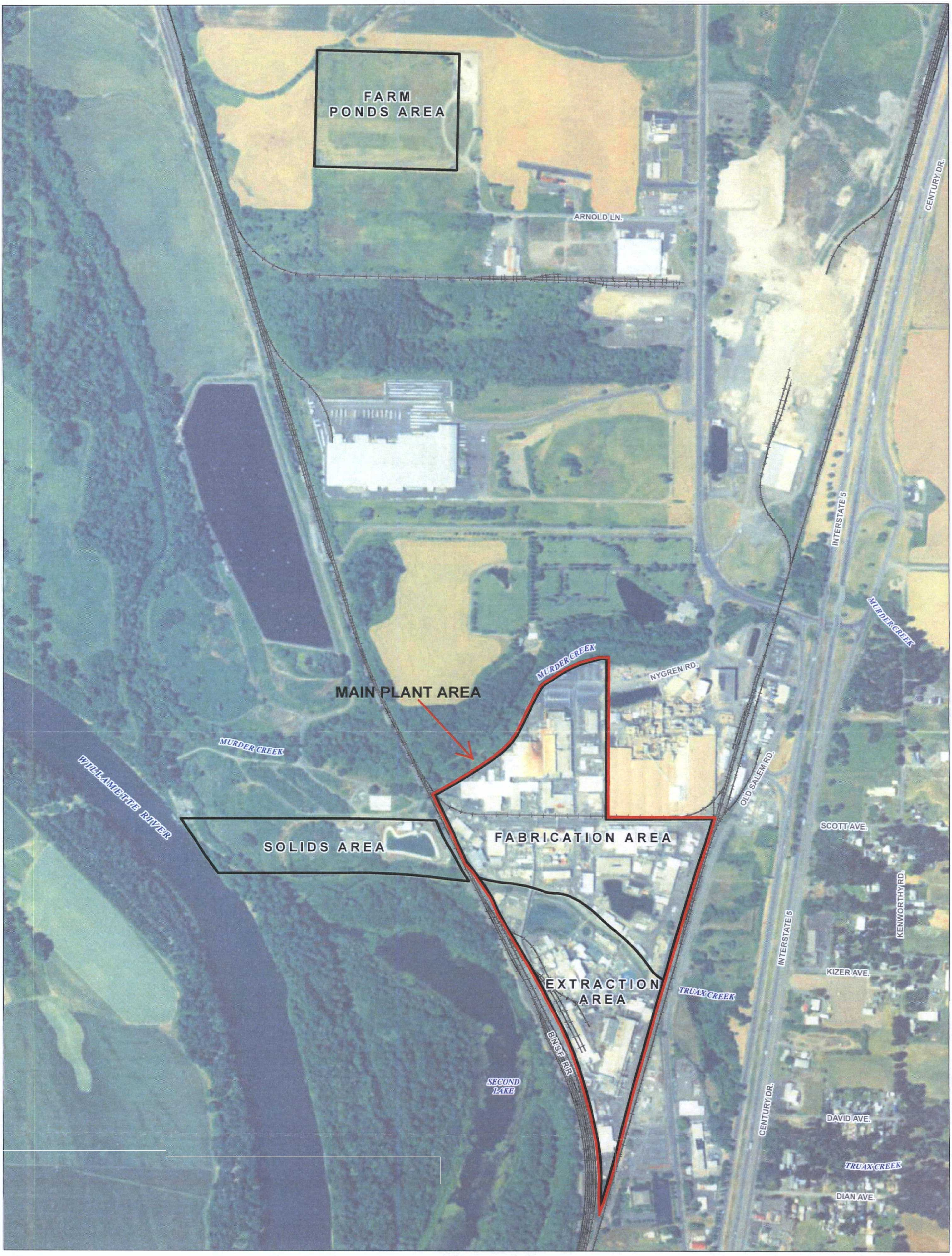

LEGEND

- Site
- Railroad
- Main Plant Area

Date: March 31, 2017
Data Sources: ATI, NAIP 2016

FIGURE 1

Site Location Map

ATI Millersburg Operations, Oregon

N

0 325 650 975
Feet

GSI Water Solutions, Inc.

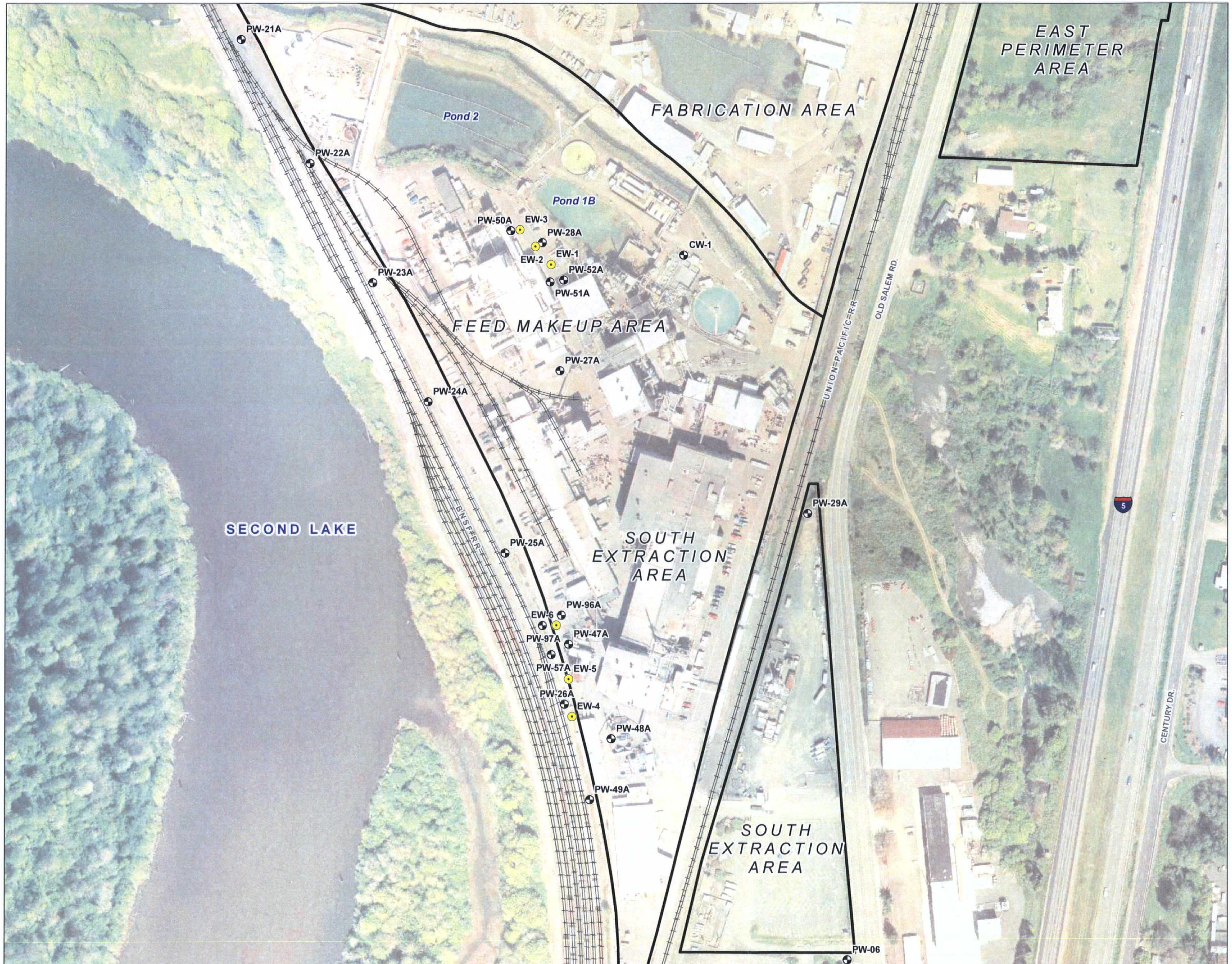

FIGURE 2

Extraction Area Monitoring Wells

ATI Millersburg Operations, Oregon

LEGEND

- Monitoring Well
- Extraction Well
- Railroad

N

0 100 200 300
Feet

Date: March 30, 2017
Data Sources: City of Albany GIS, Wah Chang

GSI Water Solutions, Inc.

Document Path: P:\Portland\168 - Wah Chang\024-2016 Enviro Consulting\Project_GIS\Project_mxds\5yr_Sitewide_Report\Figure2c_Extraction_Area_MWs.mxd

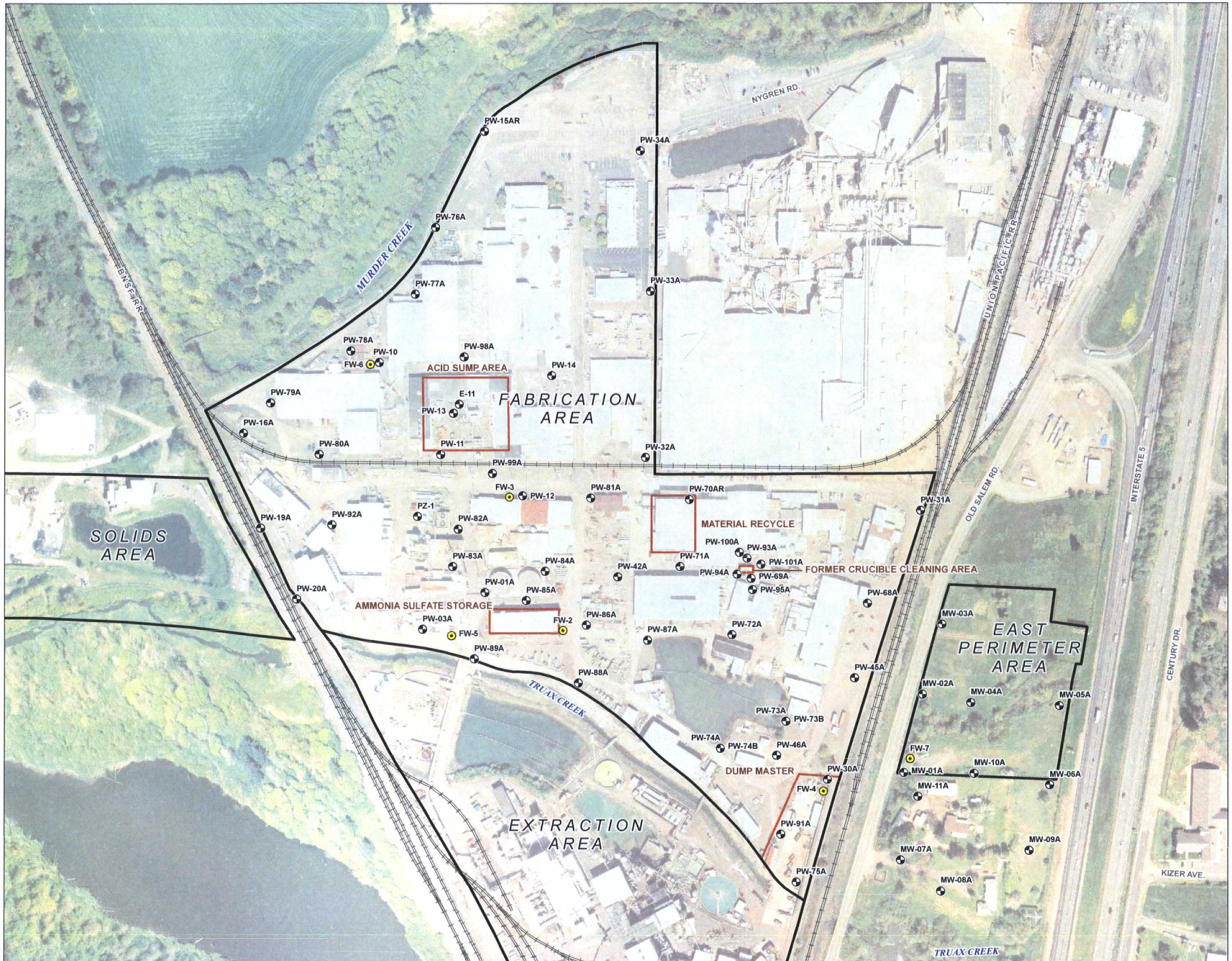

FIGURE 3

Fabrication Area Monitoring Wells

ATI Millersburg Operations, Oregon

LEGEND

- Monitoring Well
- Extraction Well
- Remediation Area
- Railroad

NOTE:
TMW-1 and TMW-4 removed August 2016. I-2, I-3, EI-5 added to monitoring network in fall of 2016.

N

0 125 250 375
Feet

Date: March 31, 2017
Data Sources: Wah Chang, City of Albany GIS

GSI Water Solutions, Inc.

Document Path: P:\Portland\168 - Wah Chang\024-2016 Enviro Consulting\Project_GIS\Project_mxds\5yr_Sitewide_Report\Figure2d_Fabrication_Area_MWs.mxd

FIGURE 4

Solids Area Monitoring Wells

ATI Millersburg Operations, Oregon

LEGEND

- PWB-1 Monitoring Well Screened in Recent Alluvium or Willamette Silt
- PWB-2 Monitoring Well Screened in Linn Gravel
- PWB-3 Monitoring Well Screened in Blue Clay or Spencer Formation
- Cell 3 Boundary
- Railroad

NOTE:
Wells W-10 and PW-08 abandoned in 1991.

N

0 100 200 300
Feet

Date: March 30, 2017
Data Sources: City of Albany GIS, ATI, NAIP 2016

GSI Water Solutions, Inc.

Document Path: P:\Portland\168 - Wah Chang\024-2016 Enviro Consulting\Project_GIS\Project_mxds\5yr_Sitewide_Report\Figure2a_Solids_Area_MWs.mxd

FIGURE 5

Farm Ponds Area Monitoring Wells

ATI Millersburg Operations, Oregon

LEGEND

- Monitoring Well
- Railroad

N

0 125 250 375
Feet

Date: March 31, 2017
Data Sources: Wah Chang, City of Albany GIS

GSI Water Solutions, Inc.

Document Path: P:\Portland\168 - Wah Chang\024-2016 Enviro Consulting\Project_GIS\Project_mxds\5yr_Sitewide_Report\Figure2b_Farm_Ponds_Area_MWs.mxd

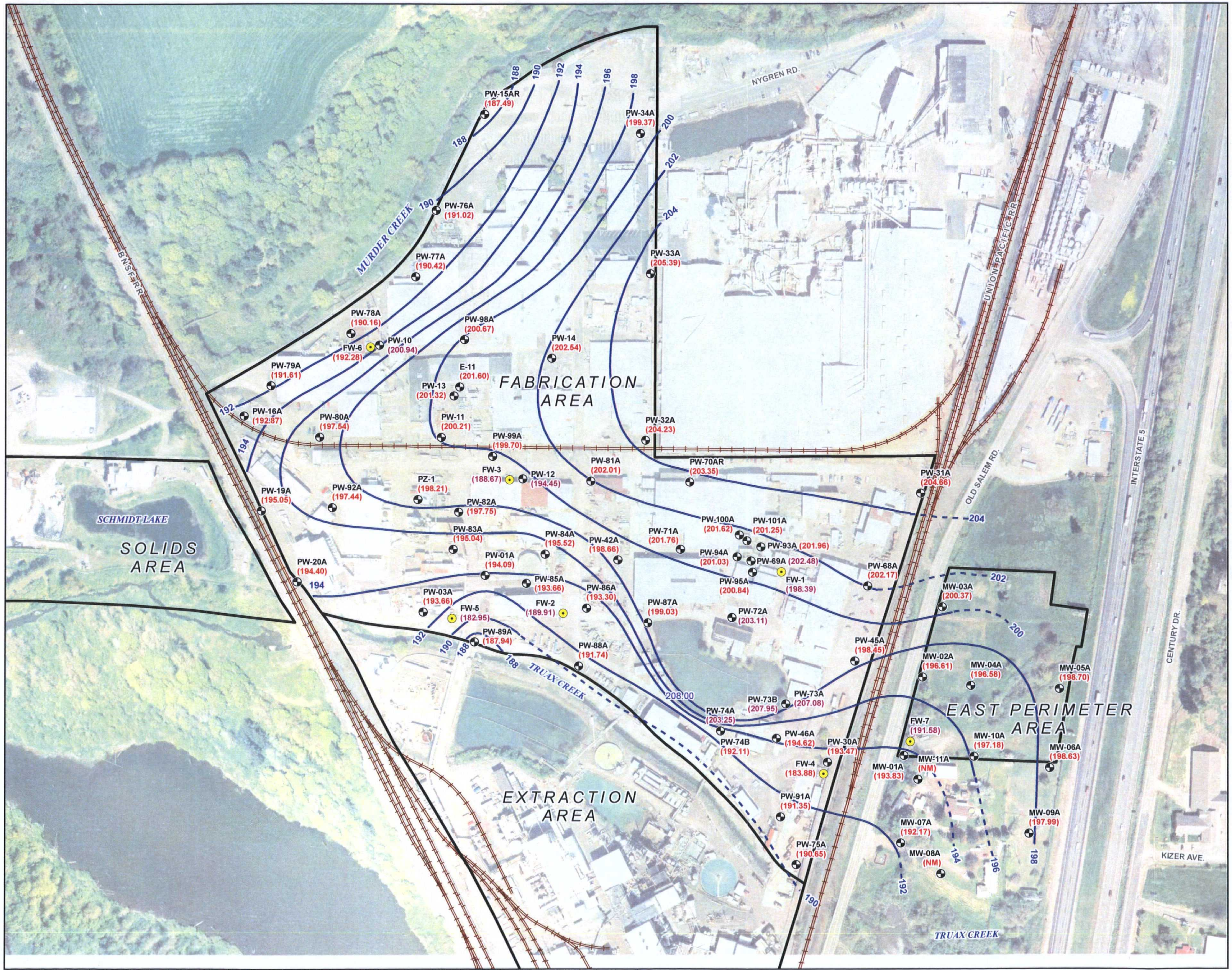

FIGURE 6

Spring 2015 Groundwater Elevations in Fabrication Area

ATI Millersburg Operations, Oregon

LEGEND

- Monitoring Well
- Extraction Well
- Groundwater Contour (dashed where inferred)
- Railroad

NOTES:

1. Red Labels = Measured Water Elevation in Feet
2. Purple Labels = Measured Water Elevation in Feet, not used in contouring. Reasons for not including in the contouring are:
   - MW-11A is located near old Hutchinson property. Capped freshwater lines may be leaking. There is also an intermittent stream nearby.
   - PW-12 is near FW-3, which is subject to fouling and is therefore routinely pumped to flush and keep lines open.
   - PW-69A is 3 feet from an outdoor fresh water spraying station that operates 24 hours a day that may leak through cracks in concrete pads.
   - PW-72A, PW-73A, and PW-74A are likely hydraulically connected to the fire water pond.
   - Per EPA's request, FW-6 is used for contouring instead of PW-10.
   - Extraction wells are not used for groundwater contouring.
3. NM - Not Measured.

N

0 125 250

Feet

MAP NOTES:

Date: October 13, 2015

Data Sources: Wah Chang, City of Albany GIS

GSI Water Solutions, Inc.

Document Path: P:\Portland\168 - Wah Chang\022_2015 EnvirConsulSvcs\Project_GIS\Project_mxds\001Annual_Reports\Fab_Area\2015\Figure3_Spring_GW_Elevation_Map_v2.mxd

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FIGURE 7

Sitewide 1,1-Dichloroethene Distribution

ATI Millersburg Operations, Oregon

LEGEND

- Monitoring Well — *DCE Concentration in ug/L*
- Extraction Well — *DCE Concentration in ug/L*
- DCE Concentrations Above the ROD Standard (7 µg/L)
- Railroad

ANALYTICAL RESULTS FROM OTHER AREAS

Extraction: No ROD exceedances
25 Wells, 16 Us, 5 Js
EW-1, 1.26, greatest concentration
Solids: No ROD exceedances
17 Wells, 13 Us, 3 Js
PWB-3, 1.2, greatest concentration
Farm Ponds: No ROD exceedances
32 Wells, 31 Us
PW-104s, 1.52, greatest concentration

NOTES:

ROD: record of decision
DCE: 1,1-Dichloroethene
J: estimated value below reporting limit
U: not detected above reporting limit
µg/L: micrograms per liter
Concentration data are from 2016 Sitewide sampling event (see appendices for complete analytical details).

N

0 125 250 375
Feet

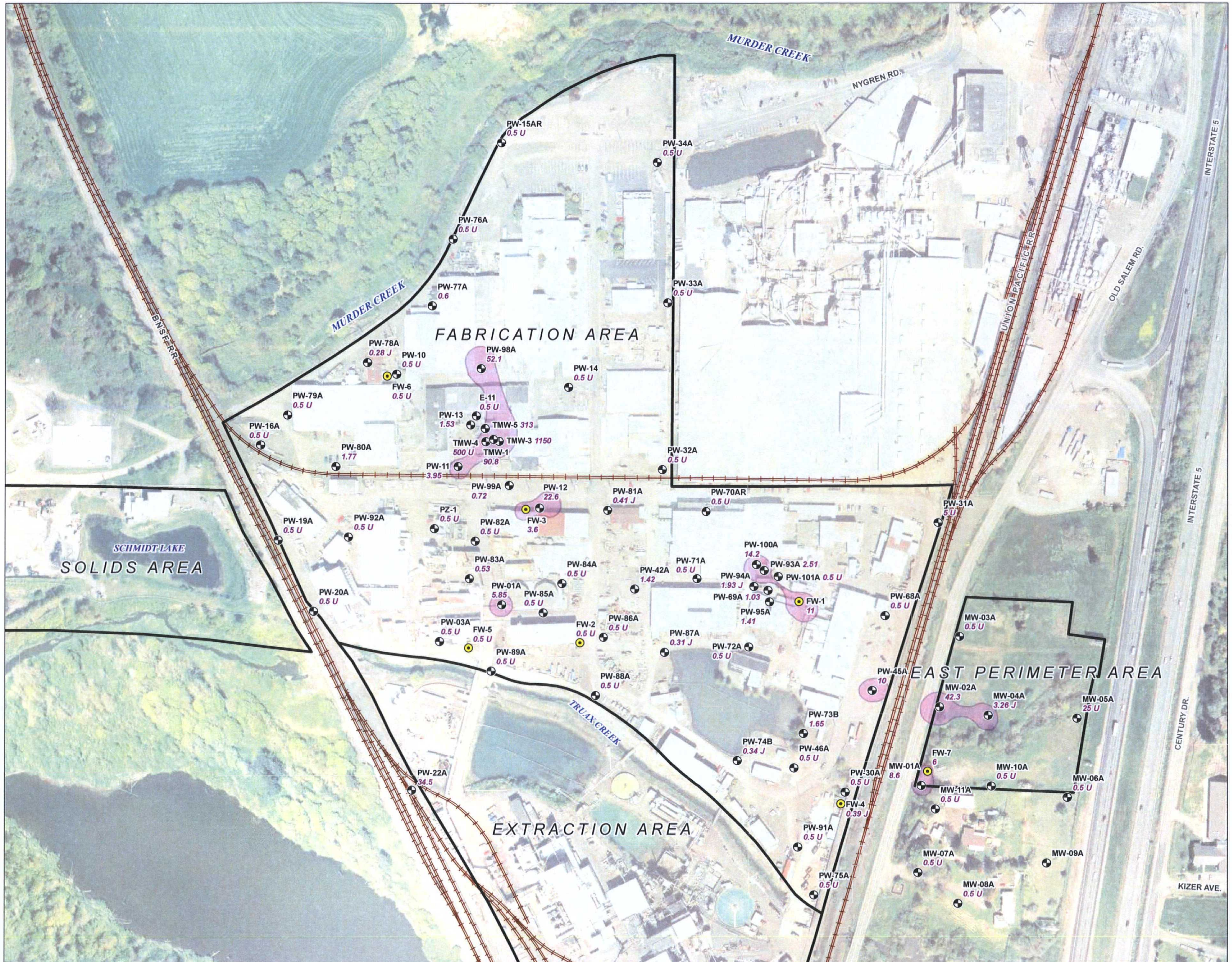
GSI Water Solutions, Inc.

Date: March 31, 2017
Data Sources: Wah Chang, City of Albany GIS

FIGURE 8

Sitewide Vinyl Chloride Distribution

ATI Millersburg Operations, Oregon



LEGEND

- Monitoring Well — *VC Concentration in ug/L*
- Extraction Well — *VC Concentration in ug/L*
- VC Concentrations Above the ROD Standard (2 µg/L)
- Railroad

ANALYTICAL RESULTS FROM OTHER AREAS

Extraction: PW-22A (shown) Above ROD, will be resampled in April 2017, no other exceedances
25 Wells, 20 Us, 2 Js

Solids: No ROD exceedances
17 Wells, 17 Us

Farm Ponds: No ROD exceedances
32 Wells, 29 Us
Detections: PW-104s, 0.55, PW-40A, 0.32 J, PW-40s, 0.3J

NOTES:
ROD: record of decision
VC: Vinyl Chloride
J: estimated value below reporting limit
U: not detected above reporting limit
µg/L: micrograms per liter
Concentration data are from 2016 Sitewide sampling event (see appendices for complete analytical details).

N

0 125 250 375
Feet

GSI Water Solutions, Inc.

Date: March 31, 2017
Data Sources: Wah Chang, City of Albany GIS

Document Path: P:\Portland\168 - Wah Chang\024-2016 Enviro Consulting\Project_GIS\Project_mxds\5yr_Sitewide_Report\Figure4_FabricationArea_VC_Concentrations.mxd

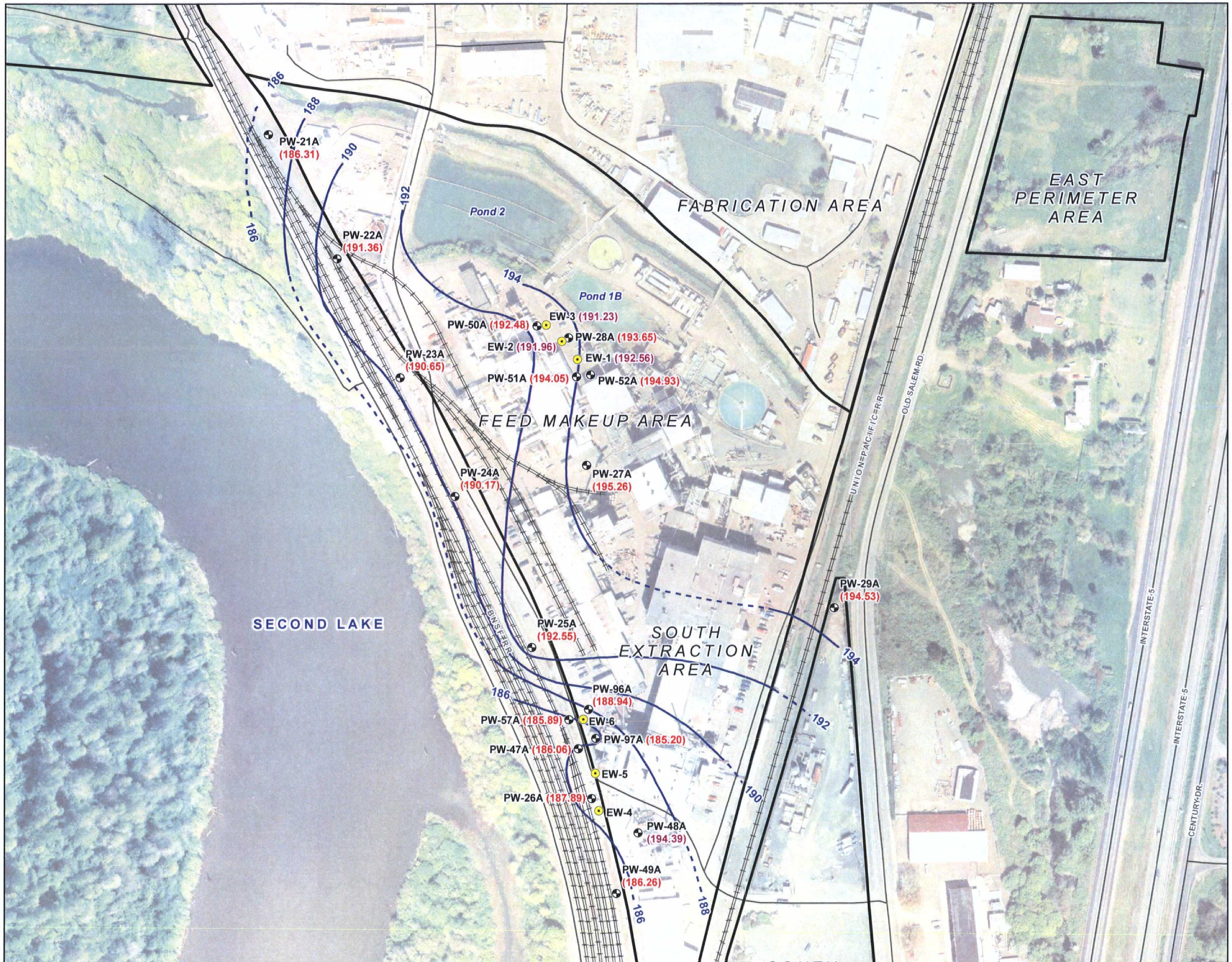


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FIGURE 9

Spring 2015 Groundwater Elevation Contours in Extraction Area

ATI Millersburg Operations, Oregon

LEGEND

- Monitoring Well
- Extraction Well
- Groundwater Contour (dashed where inferred)
- Roads
- Railroad

NOTES:

1. Red Labels = Measured Water Elevation in Feet Above Mean Sea Level (AMSL).
2. Purple Labels = Measured Water Elevation in Feet, not used in contouring.
3. Groundwater elevations measured in Spring 2014.
4. Pond elevations are variable and controlled by float switches. Ponds discharge to POTW wetlands.
5. PW-48A not used for contouring because it is a shallow well. The bottom of the screen (19.6 ft) is above the static water level at other nearby Exraction Area wells.
6. Extraction well water levels not used for contouring.

N

0 100 200 300

Feet

MAP NOTES:
Date: October 26, 2016
Data Sources: City of Albany GIS, Wah Chang

GSI Water Solutions, Inc.

FIGURE 10

2014 Monitoring Event Groundwater Contours in the Recent Alluvium or Willamette Silt

ATI Wah Chang - Albany

LEGEND

- PWB-1 — Monitoring Well Screened in Recent Alluvium or Willamette Silt
- PWB-2 — Monitoring Well Screened in Linn Gravel
- PWB-3 — Monitoring Well Screened in Blue Clay or Spencer Formation
- Groundwater Contour (dashed where inferred)
- Cell 3 Boundary
- Roads
- Railroad

NOTES:
1. Wells W-10 and PW-08 abandoned in 1991.
2. Elevations in grey not included in contouring.
3. Cell 3 lined in September 2010.
4. NM = not measured.
5. Operational Cell 3 levels are from 197' to 202.5'.
6. PW-18B groundwater measurement does not appear to be representative of groundwater elevation.
7. Wells PW-09, PWE-1, and PWE-2 were inaccessible during the monitoring event because of construction.
8. USGS Willamette River gauge 14174000 is located approximately 2.5 miles upstream near Hwy 20 bridge in Albany, Oregon. Measurement from January 6, 2015, was 177.04' (National Geodetic Vertical Datum of 1929).

N

0 100 200 300
Feet

MAP NOTES:
Date: May 22, 2015
Data Sources: City of Albany GIS, Wah Chang,
Aerial photo taken on July 5, 2011 by Microsoft

GSI Water Solutions, Inc.

Document Path: P:\Portland\168 - Wah Chang\022_2015 EnvirConsulServices\Project_GIS\Project_mxds\001Annual_Reports\Figure2_Solids_Area_GW_Contour_Map.mxd

FIGURE 11

Surface Water Sample Locations

ATI Millersburg Operations, Oregon

LEGEND

▲ Surface Water Sample Location

Railroad

NOTES:

TC: Truax Creek
MC: Murder Creek
U: Upstream
M: Middle stream
D: Downstream

N

0 125 250 375
Feet

GSI Water Solutions, Inc.

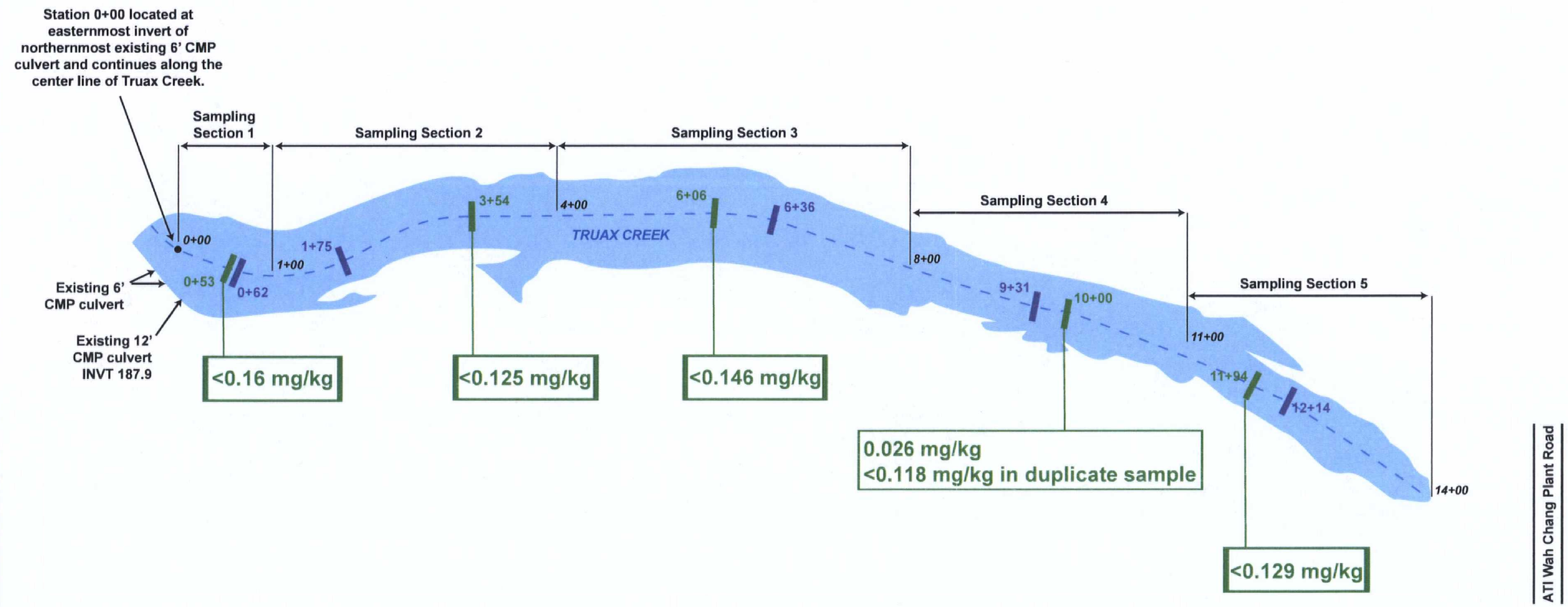
Date: March 30, 2017
Data Sources: Wah Chang, City of Albany GIS

Document Path: P:\Portland\168 - Wah Chang\024-2016 Enviro Consulting\Project_GIS\Project_mxds\5yr_Sitewide_Report\Figure2e_Fabrication_Area_SW.mxd

FIGURE 12

Truax Creek Sediment Sampling Results within Wah Chang Property Boundary (August 2015)

ATI Wah Chang

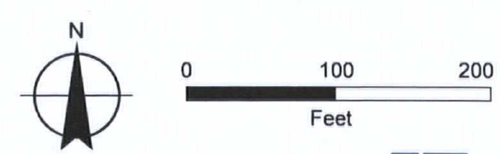


LEGEND

Sampling Station (2007)
Sampling Station (2015)
Creek Center Line

NOTES

1. Results presented are for total PCBs by EPA Method 8082. See Table 1 for additional sampling station and analytical details.
2. Sampling results are a composite of three sub-locations collected in the upper 6 inches of sediment at the sampling station.
3. < = sum of reporting limits for sample where PCBs were not detected.
4. mg = milligrams.
5. kg = kilograms.
6. CMP = corrugated metal pipe.



MAP NOTES:
Date: November 19, 2015
Sources: *Traux Creek Sediment Remediation O&M Plan & SAP*, 1997, Wah Chang, Albany, Oregon

GSI Water Solutions, Inc.

P:\Portland\168 - Wah Chang\022_2015 EnvirConsulServices\003 Remediation Support\005 Truax Creek\Figures

APPENDIX A
REFERENCE LIST

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REFERENCE LIST

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APPENDIX B
SITE CHRONOLOGY

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Chronology of Site Events

Event	Date
Production of zirconium begins	1957
Melting and fabrication facilities added	1959
Teledyne Industries, Inc. purchased Wah Chang	1967
Chlorinator residues disposed of at Teledyne Wah Chang	1972-1978
Application of lime solids to Soil Amendment Area	1976
Confirmation of radioactive materials in unlined sludge ponds (OSHD)	1977
NORM license granted to Teledyne Wah Chang	3/1978
Use of V-2 Pond discontinued	1979
Farm Ponds constructed	1979
TWC facility proposed for inclusion on National Priorities List (NPL)	1982
TWC listed on NPL	10/1983
Magnesium Resource Recovery Pile (MRRP) project	1983-1988
All underground storage tanks removed	1987
V-2 pond emptied	1989
Record of Decision (ROD) for Sludge Ponds Unit is signed	12/28/1989
Schmidt Lake soil removal	6/19-11/6/1991
Removal action for Lower River Solids Pond (LRSP) and Schmidt Lake	1991-1993
Teledyne Wah Chang completed Remedial Investigation/Feasibility Study (RI/FS)	3/1993
Supplemental radioactive material removal action for Schmidt Lake	8/1992-1/1993
Polychlorinated biphenyl (PCB) soil removal in the Building 114 area	11/1992
EPA issued certification of completion for the Sludge Ponds Unit	6/1993
Ownership of Soil Amendment Area transferred to the City of Millersburg	1994
Groundwater and Sediments ROD signed	6/10/1994
Surface and Subsurface Soil ROD signed	9/27/1995
Remedial actions for the OU2 and OU3 RODs implemented in accordance with Scope of Work (SOW)	9/19/1996
Groundwater Explanation of Significant Differences (ESD)	10/8/1996
Consent Decree lodged with U.S. District Court and State of Oregon	1/31/1997
Sediment cleanup of Truax Creek complete	1997
Sand Unloading Area removal	10/1997
First Five-Year Review	1997
Access Agreement signed for Sapp property	9/18/1998
Teledyne Wah Chang becomes Allegheny Technologies Inc. (ATI) Wah Chang	1999
Front Parking Lot Certificate of Completion	8/1999
Operation of South Extraction Area Groundwater Extraction and Treatment System (GETS) begins	10/2000
Soil and Subsurface Soil ESD	9/28/2001
Operation of Fabrication Area GETS begins	4/2001-8/2001
Operation of Feed Makeup Area GETS begins	4/2002
Second Five-Year Review	2003

Event	Date
Land Transfer of Solids Area to City of Albany	2004
Soil Amendment ICs implemented	2006
Proposed Consent Decree for the Soil Amendment ICs lodged with U.S. District Court: 3/27/06.	3/27/2006
Three-Year Groundwater Remedy Evaluation Reports for the Fabrication, Extraction, Solids and Farm Ponds Areas submitted.	2/2007 -9/2007
Discovery of DNAPL during drilling of FW-8 in the Acid Sump Area	9/2007
Third Five-Year Review	1/2008
In Situ Bioremediation Pilot project begins in the South Extraction Area	3/2008
Second ESD for OU 2	6/2009
In Situ Bioremediation begins in the Acid Sump Area	2009
In Situ Bioremediation begins in the Crucible Cleaning Area	2010
Cell 3 (formerly Schmidt Lake) lined with high density polyethylene	9/2010
Groundwater Extraction System in South Extraction Area Shut Down	4/2011
Berm and well removal at Farm Ponds Area	2012
Deep Hole Boring Machine Area Groundwater Investigation	8/2012
Fourth Five-Year Review	1/2013
Third ESD for OU2	4/2013
Soil Flushing Treatability Study in Feed Makeup Area	6/2013
Wastewater Release OU2	2/2014
Deep Hole Boring Machine Area Pore Water Investigation	7/2015
Deed Restriction Farm Ponds Area	2/2016
Well Installation at Farm Ponds Area	3/2016
Acid Sump Area Source Removal	8/2016
Fifth Five-Year Review	12/2017

APPENDIX C
PUBLIC NOTICES

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Asking for Public Comment for Teledyne Wah Chang Cleanup

EPA
United States Environmental Protection Agency
Region 10

January 2017

The Environmental Protection Agency is starting the latest Protectiveness Review for the Teledyne Wah Chang Superfund Site and invites your input. Protectiveness Reviews assess sites every five years to ensure cleanups continue to be protective of human health and the environment.

Teledyne Wah Chang is located in Millersburg, Oregon. Site contamination affecting sediments, soils and groundwater occurred as a result of metal production. Groundwater Extraction and Treatment, enhanced by adding microbial and other chemical treatment, is ongoing. Groundwater cleanup levels are expected to be met in 2017.

We want to keep you informed. Also, you may have information helpful to the review team. Please contact Ravi Sanga, EPA Project Manager at 206-553-4092 or sanga.ravi@epa.gov if you have anything you would like us to consider during our review before April 30th, 2017.

For more information, go to Teledyne Wah Chang's site page: **http://go.usa.gov/x9mw8**.

Asking for Public Comment for Teledyne Wah Chang Cleanup

EPA
United States Environmental Protection Agency
Region 10

January 2017

The Environmental Protection Agency is starting the latest Protectiveness Review for the Teledyne Wah Chang Superfund Site and invites your input. Protectiveness Reviews assess sites every five years to ensure cleanups continue to be protective of human health and the environment.

Teledyne Wah Chang is located in Millersburg, Oregon. Site contamination affecting sediments, soils and groundwater occurred as a result of metal production. Groundwater Extraction and Treatment, enhanced by adding microbial and other chemical treatment, is ongoing. Groundwater cleanup levels are expected to be met in 2017.

We want to keep you informed. Also, you may have information helpful to the review team. Please contact Ravi Sanga, EPA Project Manager at 206-553-4092 or sanga.ravi@epa.gov if you have anything you would like us to consider during our review before April 30th, 2017.

For more information, go to Teledyne Wah Chang's site page: **http://go.usa.gov/x9mw8**.

EPA United States Environmental Protection Agency

Region 10
1200 Sixth Ave. Suite 900 – RAD 202
Seattle, WA 98101

Pre-Sorted Standard
Postage and Fees
Paid
U.S. EPA
Permit No. G-35
Seattle, WA

Inviting Public Comment on Teledyne Wah Chang Cleanup

EPA United States Environmental Protection Agency

Region 10
1200 Sixth Ave. Suite 900 – RAD 202
Seattle, WA 98101

Pre-Sorted Standard
Postage and Fees
Paid
U.S. EPA
Permit No. G-35
Seattle, WA

Inviting Public Comment on Teledyne Wah Chang Cleanup

APPENDIX D
INTERVIEW FORMS

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SUPERFUND FIVE-YEAR REVIEW SITE SURVEY		
Site Name: Teledyne Wah Chang Albany Superfund Site		**EPA ID No.:** ORD050955848
Location: Millersburg, Linn County, Oregon		**Date:** May 18, 2017
Contact Made By:		
Name: Ravi Sanga	**Title:** Remedial Project Manager	**Organization:** U.S. EPA
Stephanie Mairs	**Title:** Legal Representative	**Organization:** U.S. EPA
Jil Frain	**Title:** Engineer	**Organization:** EA Engineering, Science, and Technology, Inc., PBC
Individual Contacted:		
Name: Jim Lepin	**Title:** Mayor	**Organization:** City of Millersburg
Stephen Hasson	**Title:** City Manager	**Organization:** City of Millersburg
Forrest Reid	**Title:** Legal Representative	**Organization:** City of Millersburg

Survey Questions

The purpose of the five-year review is to evaluate the implementation and performance of the remedy, and to confirm that human health and the environment continue to be protected by the remedial actions that have been performed at the site. This interview is being conducted as a part of the fifth five-year review for the Teledyne Wah Chang Albany Superfund Site. The scope of the review is from 2012 to the present.

1. What is your general impression of the work conducted at the site since the fourth Five-Year Review period (since December 2012)?

   Note that responses to questions are only related to the property owned by the City of Millersburg.

   Property is only being used for crops (hay and clover) at this time, no other activities are conducted.

2. What is your overall impression of the remedial actions implemented at the site?

   City is fine with the remedial actions implemented to date. Will need guidance from EPA if the property is redeveloped as industrial to address contamination.

3. From your perspective, what effects have site operations had on the surrounding community?

   Not aware of any effects.

4. During this review period, are you aware of any community concerns regarding the site or its operation and administration? If so, please provide details.

   Not aware of any concerns.

5. Are you aware of any events, incidents, or activities at the site during this review period, such as vandalism, trespassing, or emergency responses from local authorities? If so, please provide details.

   No.

6. Do you feel well informed about the site's activities and progress? If not, please indicate how you would like to be informed about the site activities – for example, by e-mail, regular mail, fact sheets, meetings, etc.

   Would be interested in the results of the activity based sampling of the property. Mail or email are acceptable.

SUPERFUND FIVE-YEAR REVIEW SITE SURVEY	
Site Name: Teledyne Wah Chang Albany Superfund Site	**EPA ID No.:** ORD050955848
Location: Millersburg, Linn County, Oregon	**Date:** May 18, 2017

7. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

   No.

   FOR PUBLIC OFFICIALS:

8. Have there been any concerns from you constituents, violations, or other incidents related to the contamination at Teledyne Wah Chang that require(d) a response from your office? If so, please provide details on concern and response.

   No.

9. Are you aware of any changes in State or Local regulations that may impact site protectiveness?

   Not that they are aware of.

10. Are you aware of any complaints about the site, or any trespassing?

    No.

11. Has the site been in compliance with permitting or reporting requirements that you are aware of?

    Yes.

SUPERFUND FIVE-YEAR REVIEW SITE SURVEY	
Site Name: Teledyne Wah Chang Albany Superfund Site	**EPA ID No.:** ORD050955848
Location: Millersburg, Linn County, Oregon	**Date:** 04/14/2017

Contact Made By:		
Name: Ravi Sanga	**Title:** Remedial Project Manager	**Organization:** U.S. EPA
Name: Jil Frain	**Title:** Consultant Project Manager	**Organization:** EA Engineering, Science, and Technology, Inc., PBC

Individual Contacted:		
Name: David Farrer	**Title:** Public Health Toxicologist	**Organization:** Oregon Department of Health

Survey Questions

The purpose of the five-year review is to evaluate the implementation and performance of the remedy, and to confirm that human health and the environment continue to be protected by the remedial actions that have been performed at the site. This interview is being conducted as a part of the fifth five-year review for the Teledyne Wah Chang Albany Superfund Site. The scope of the review is from 2012 to the present.

1. What is your general impression of the work conducted at the site since the fourth Five-Year Review period (since December 2012)?

   Not familiar with the work since 2012.

2. What is your overall impression of the remedial actions implemented at the site?

   When last interacting with the site, the actions seemed thorough and protective.

3. From your perspective, what effects have site operations had on the surrounding community?

   Do not know

4. During this review period, are you aware of any community concerns regarding the site or its operation and administration? If so, please provide details.

   He has not had any communication from community surrounding the Site.

5. Are you aware of any events, incidents, or activities at the site during this review period, such as vandalism, trespassing, or emergency responses from local authorities? If so, please provide details.

   He is not aware of any.

6. Do you feel well informed about the site's activities and progress? If not, please indicate how you would like to be informed about the site activities – for example, by e-mail, regular mail, fact sheets, meetings, etc.

   Does not feel informed, but he knows where to get the information. He would like to be included on the Site's mailing list.

7. Do you have any comments, suggestions, or recommendations regarding the site's management or

SUPERFUND FIVE-YEAR REVIEW SITE SURVEY	
Site Name: Teledyne Wah Chang Albany Superfund Site	**EPA ID No.:** ORD050955848
Location: Millersburg, Linn County, Oregon	**Date:** 04/14/2017

operation?

No

8. Have there been any concerns from your constituents, violations, or other incidents related to the contamination at Teledyne Wah Chang that require(d) a response from your office? If so, please provide details on concern and response.

   No

9. Are you aware of any changes in State or Local regulations that may impact site protectiveness?

   No

10. Are you aware of any complaints about the site, or any trespassing?

    No

11. Has the site been in compliance with permitting or reporting requirements that you are aware of?

    None that he is aware of.

SUPERFUND FIVE-YEAR REVIEW SITE SURVEY		
Site Name: Teledyne Wah Chang Albany Superfund Site		**EPA ID No.:** ORD050955848
Location: Millersburg, Linn County, Oregon		**Date:** 04/11/2017
Contact Made By:		
Name: Ravi Sanga	**Title:** Remedial Project Manager	**Organization:** U.S. EPA
Name: Jil Frain	**Title:** Consultant Project Manager	**Organization:** EA Engineering, Science, and Technology, Inc., PBC
Individual Contacted:		
Name: Greg Aitken	**Title:** Hydrogeologist, Oregon Department of Environmental Quality (ODEQ). Site Project Manager	**Organization:** ODEQ, Environmental Cleanup
Survey Questions		

The purpose of the five-year review is to evaluate the implementation and performance of the remedy, and to confirm that human health and the environment continue to be protected by the remedial actions that have been performed at the site. This interview is being conducted as a part of the fifth five-year review for the Teledyne Wah Chang Albany Superfund Site. The scope of the review is from 2012 to the present.

1. What is your general impression of the work conducted at the site since the fourth Five-Year Review period (since December 2012)?

   Favorably impressed with quantity and quality of work completed by the PRP and their consultants within the last five years. Very responsive to concerns. PRP competent, engaged, clear on state and federal regulations in relation to site

2. What is your overall impression of the remedial actions implemented at the site?

   Within last five years, as good as can be expected given the challenges associated with this cleanup. Sufficient resources have been deployed to cleanup within difficult site constraints. Contractor for PRP has the technical expertise to handle site cleanup, given the challenges of the site. PRP and consultant have been responsive to ODEQ regarding the site.

   Specific to the Acid Sump work, adequate care, especially regarding the safety concerns involved. Good approach to excavation, geotechnical stabilization.

3. From your perspective, what effects have site operations had on the surrounding community?

   None that he is aware of. No one from the local community, or any state or elected officials have reached out to the State either favorably or unfavorably.

4. During this review period, are you aware of any community concerns regarding the site or its operation and administration? If so, please provide details.

   Not aware of anything substantive this five-year review cycle

5. Are you aware of any events, incidents, or activities at the site during this review period, such as vandalism, trespassing, or emergency responses from local authorities? If so, please provide details.

SUPERFUND FIVE-YEAR REVIEW SITE SURVEY	
Site Name: Teledyne Wah Chang Albany Superfund Site	**EPA ID No.:** ORD050955848
Location: Millersburg, Linn County, Oregon	**Date:** 04/11/2017

Not aware of any within this five-year review cycle

6. Do you feel well informed about the site's activities and progress? If not, please indicate how you would like to be informed about the site activities – for example, by e-mail, regular mail, fact sheets, meetings, etc.

   Yes. Feels well informed. Less clear on the EPA versus State coordination when public communications need to occur.

7. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

   Site is more complicated than he could fully understand, but he has always felt that the PRP has been forthright and responsive to questions he has regarding site environmental conditions.

8. Have there been any concerns from your constituents, violations, or other incidents related to the contamination at Teledyne Wah Chang that require(d) a response from your office? If so, please provide details on concern and response.

   No

9. Are you aware of any changes in State or Local regulations that may impact site protectiveness?

   State risk based cleanup levels have changed, but the ROD requirements still meet or exceed what the State might require in regards to beneficial groundwater use and local land use assumptions.

   Changes to cleanup levels—but they are still higher than the EPA cleanup levels.

   There were no substantive changes since 2012.

10. Are you aware of any complaints about the site, or any trespassing?

    No

11. Has the site been in compliance with permitting or reporting requirements that you are aware of?

    Yes, for water quality and air permits.

APPENDIX E
SITE INSPECTION FORMS

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FIVE-YEAR REVIEW SITE VISIT CHECKLIST

I. SITE INFORMATION

Site Name: **Teledyne Wah Chang**	**Date of Inspection:** **14 March 2017**
Location and Region:	**EPA ID:** ORD050955848
Agency, office, or company leading the five-year review: U.S. Environmental Protection Agency, Region 10	**Weather/temperature:** Overcast and rainy/Temp 50's

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☒ Ground water pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other (Monitored natural attenuation)

II. INTERVIEWS (Check all that apply)

1. O&M Site Manager Ravi Sanga (Name) Remedial Project Manager (Title)

Interviewed: ☐ by mail ☒ at office ☐ by phone Phone no. ______

Problems, suggestions: ☐ Report attached

2. O&M Staff Peter Pellegrin, GSI (Name) ______ (Title) ______ (Date)

Interviewed: ☐ by mail ☒ at office ☒ by phone Phone no. ______

Problems, suggestions: ☐ Report attached

3. Other interviews (optional): ☒ Report attached to Five-Year Review Report

See Appendix D

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. O&M Documents

☒ O&M manual (long term monitoring plan)	☒ Readily available	☐ Up to date	☐ N/A
☐ As-built drawings	☐ Readily available	☐ Up to date	☒ N/A
☒ Maintenance logs	☒ Readily available	☒ Up to date	☐ N/A

Remarks: Current as-builts not available

2. Site-Specific Health and Safety Plan ☒ Readily available ☒ Up to date ☐ N/A

☒ Contingency plan/emergency response plan ☒ Readily available ☒ Up to date ☐ N/A

Remarks: ______

3. O&M and OSHA Training Records ☐ Readily available ☐ Up to date ☒ N/A

Remarks: ______

4. Permits and Service Agreements

☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☐ N/A
☒ Waste disposal, POTW	☐ Readily available	☐ Up to date	☐ N/A
☐ Other permits ______	☐ Readily available	☐ Up to date	☐ N/A

Remarks: ______

5. **Gas Generation Records**	☐	Readily available	☐ Up to date	☒ N/A
6. **Settlement Monument Records**		☐ Readily available	☐ Up to date	☒ N/A
7. **Ground Water Monitoring Records** N/A		☐ Readily available	☐ Up to date	☒
8. **Leachate Extraction Records** N/A		☐ Readily available	☐ Up to date	☒
9. **Discharge Compliance Records**				
☐ Air		☐ Readily available	☐ Up to date	☐ N/A
☐ Water (effluent)	☐	Readily available	☐ Up to date	☐ N/A
Remarks:				
10. **Daily Access/Security Logs**		☐ Readily available	☒ Up to date	☐ N/A
Remarks:				

IV. O&M COSTS

1. O&M Organization

☐ State in-house ☐ Contractor for State ☒ PRP in-house

☐ Contractor for PRP ☐ Other ____

2. O&M Cost Records NOT PROVIDED

☐ Readily available ☐ Up to date ☐ Funding mechanism/agreement in place

☐ Original O&M cost estimate ☐ Breakdown attached

3. Unanticipated or Unusually High O&M Costs During Review Period

Information not available

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. Fencing damaged ☐ Location shown on site map ☒ Gates secured ☐ N/A

Remarks: Fences and security in good condition.

B. Other Access Restrictions

1. Signs and other security measures ☐ Location shown on site map ☐ N/A

Remarks: Access to site secure. Guard gates staffed. Unstaffed gates require key card for entry.

C. Institutional Controls

1. Implementation and enforcement

Site conditions imply ICs not properly implemented	☐ Yes	☒ No	☐ N/A
Site conditions imply ICs not being fully enforced	☐ Yes	☒ No	☐ N/A
Reporting is up-to-date	☐ Yes	☐ No	☒ N/A
Reports are verified by the lead agency	☐ Yes	☐ No	☒ N/A
Specific requirements in deed or decision documents have been met	☐ Yes	☐ No	☒ N/A
Violations have been reported	☐ Yes	☐ No	☒ N/A

2. Adequacy ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A
Remarks: ______

D. General

1. Vandalism/trespassing ☐ Location shown on site map ☒ No vandalism evident
Remarks: ______

2. Land use changes onsite ☐ N/A
Remarks: None noted

3. Land use changes offsite ☐ N/A
Remarks: None noted

VI. GENERAL SITE CONDITIONS

A. Roads ☐ Applicable ☒ N/A

1. Roads damaged ☐ Location shown on site map ☒ Roads adequate ☐ N/A
Remarks: ______

B. Other Site Conditions

Remarks: ______

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

IX. GROUND WATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

A. Ground Water Extraction Wells, Pumps, and Pipelines ☒ Applicable ☐ N/A

1. Pumps, Wellhead Plumbing, and Electrical
☒ Good condition ☒ All required wells located ☐ Needs O&M ☐ N/A
Remarks: ______

2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances
☒ Good condition ☐ Needs O&M
Remarks: ______

3. Spare Parts and Equipment
☒ Readily available ☒ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks: ______

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

C. Treatment System ☒ Applicable ☐ N/A

1. Treatment Train (Check components that apply)
☐ Metals removal ☐ Oil/water separation ☒ Bioremediation
☐ Air stripping ☐ Carbon absorbers
☐ Filters ______
☐ Additive (e.g., chelation agent, flocculent) ______
☐ Others ______

	☐ Good condition ☐ Needs O&M ☐ Sampling ports properly marked and functional ☐ Sampling/maintenance log displayed and up to date ☐ Equipment properly identified ☐ Quantity of ground water treated annually ________ ☐ Quantity of surface water treated annually ________ Remarks: Did not see treatment facility
2.	**Electrical Enclosures and Panels** (Properly rated and functional) ☐ N/A ☒ Good condition ☐ Needs O&M Remarks: Corrosion noted at treatment building in FMA.
3.	**Tanks, Vaults, Storage Vessels** ☒ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs O&M Remarks:
4.	**Discharge Structure and Appurtenances** ☒ N/A ☐ Good condition ☐ Needs O&M Remarks:
5.	**Treatment Building(s)** ☐ N/A ☒ Good condition (esp. roof and doorways) ☐ Needs repair ☒ Chemicals and equipment properly stored Remarks:
6.	**Monitoring Wells** (Pump and treatment remedy) ☐ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☒ Good condition ☐ All required wells located ☐ Needs O&M ☐ N/A Remarks: In general, wells were functioning. Some wells had missing locks and some flush mount wells had missing bolts.
D.	**Monitored Natural Attenuation** ☒ Applicable ☐ N/A
1.	**Monitoring Wells** (Natural attenuation remedy) ☒ Properly secured/locked ☐ Functioning ☐ Routinely sampled (quarterly) ☐ Good condition ☐ All required wells located ☐ Needs O&M ☐ N/A Remarks:
	X. OTHER REMEDIES
	If there are remedies applied at the site that are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy.
	XI. OVERALL OBSERVATIONS
A.	**Implementation of the Remedy**
	Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.). See Five Year Review Report
B.	**Adequacy of O&M**
	Systems appeared well maintained, minor corrosion visible on treatment system 1 electrical panel
C.	**Early Indicators of Potential Remedy Failure**
	None noted
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. See Five Year Review Report

APPENDIX F
DATA TABLES

Table A-1	Fabrication Area Monitoring Well Concentrations for 1, 1, 1-Trichloroethane (TCA)
Table A-2	Fabrication Area Monitoring Well Concentrations for 1,1-Dichloroethene (DCE)
Table A-3	Fabrication Area Monitoring Well Concentrations for Trichloroethene (TCE)
Table A-4	Fabrication Area Monitoring Well Concentrations for Tetrachloroethene (PCE)
Table A-5	Fabrication Area Monitoring Well Concentrations for Vinyl Chloride (VC)
Table A-6	Fabrication Area Monitoring Well Concentrations for 1, 1 -Dichloroethane (DCA)
Table A-7	Fabrication Area Monitoring Well Concentrations for Nitrate
Table A-8	Fabrication Area Monitoring Well Concentrations for Ammonium
Table A-9	Fabrication Area Monitoring Well Concentrations for Fluoride
Table A-10	Fabrication Area Sitewide Results for Wells Sampled Only in 2016, Volatile Organic Compounds
Table B-1	Extraction Area – Feed Makeup Area Groundwater Data 2009 to 2016
Table B-2	Extraction Area – Feed Makeup Area Results for Wells Sampled Only in 2016, Total Metals
Table B-3	Extraction Area – Feed Makeup Area Results for Wells Sampled Only in 2016, Volatile Organic Compounds
Table C-1	Extraction Area – South Extraction Area Groundwater Data 2009-2016
Table D-1	Farm Ponds Area Historical Chlorinated Volatile Organic Compound Data
Table D-2	Farm Ponds Area Results for Wells Sampled Only in 2016, Volatile Organic Compounds
Table D-3	Farm Ponds Area Results for Wells Sampled Only in 2016, Total Metals
Table E-1	Solids Area Groundwater Data 2009 to 2016
Table E-2	Solids Areas Results for Wells Sampled Only in 2016, Total Metals
Table E-3	Solids Area Results for Wells Sampled Only in 2016, Radium 266/228 Data
Table F-1	Surface Water Data, Volatile Organic Compounds 2009 to 2016

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Table A-1
Fabrication Area Monitoring Well Concentrations for 1, 1, 1-Trichloroethane (TCA)

Contaminant Source	Extraction Well	Well ID	ROD Standard (MCL)	ROD Standard (1E-06 RBC)	Baseline Fall 2000	Spring 2009	Fall 2009	Spring 2010	Fall 2010	Spring 2011	Fall 2011	Spring 2012	Fall 2012	Spring 2013	Fall 2013	Spring 2014	Fall 2014	Spring 2015	Spring 2016
Hot Spot Monitoring Wells																			
Acid Sump	FW-3	PW-11	200	-	135	16.5	21.1	15.2	4.61	3.1	1.65	13.9	11.5	10.2	**254**	176	43.5	85.4	131
Acid Sump	FW-3	PW-12	200	-	**8100**	**2490**	**1190**	**823**	**389**	**364**	65	**1710** E	**308**	**251**	**1160**	**1170**	**894**	**1360**	**527**
Acid Sump	FW-3	PW-13	200	-	**564**	**417**	175	152	15.6	56	8.77	10.4	9.98	9.77	154	197	113	139	13.5
Acid Sump	FW-3	PW-99A	200	-		27.5	54.6	22.1	7.15	8.94	5.18	24	19.3	11.2	43.5	131	43	26.7	38.3
Acid Sump	FW-3	E-11	200	-				0.5 U	0.5 U	0.5 U	0.5 U	0.24 J	0.5 U	0.5 U	0.29 J	1.6	6.28	1	0.5
Material Recycle	FW-2	PW-42A	200	-	3.2	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Material Recycle	FW-2	PW-85A	200	-	37.3	3.28	11.2	8.95	6.18	6.34	2.34	4.56	3.07	2.91	2.34	1.71	0.68	0.61	0.33 J
Material Recycle	FW-2	PW-86A	200	-	2.6	0.27 J	1.04	0.98	0.33 J	0.54	0.5 U	0.21 J	0.5 U	0.5 U	0.75	0.57	0.5 U	0.26 J	0.15 J
Amm-Sulfate Stg	FW-5	PW-01A	200	-	1 U	0.12 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	31.8	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Amm-Sulfate Stg	FW-5	PW-03A	200	-	26.6	0.17 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Amm-Sulfate Stg	FW-5	PW-83A	200	-	10.2	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Former CCA	FW-1	PW-45A	200	-	6.3	0.11 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Former CCA	FW-1	PW-68A	200	-	**652**	2.51	0.16 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Former CCA	FW-1	PW-69A	200	-	**3790**	**386**	**451**	**368**	28.8	**245**	13.4	43.4	127 E	111	145	9.5	103	95.4	60.5
Former CCA	FW-1	PW-71A	200	-	18.3	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Former CCA	FW-1	PW-100A	200	-				0.99	113	102	84.5	35.3	0.95	0.81	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Former CCA	FW-7	MW-01A	200	-	2.4	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Former CCA	FW-7	MW-02A	200	-	37	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Former CCA	FW-7	MW-03A	200	-	3.7	0.5 U	0.45 J	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Former CCA	FW-7	MW-04A	200	-	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Former CCA	FW-7	PW-93A	200	-		**13300**	**9980**	**11100**	**1120**	**5970**	**845**	**350**	19.6	16.7	11.5	10.1	28.2	28.7	18.8
Former CCA	FW-7	PW-94A	200	-		43.5	183	39	197	12	156	129 E	153 E	146	**260**	**1380**	**1610**	**1830**	**2460**
Former CCA	FW-7	PW-95A	200	-		**1820**	**205**	**348**	90.4	**234**	45.2		175 E	156	132	65.2	**582**	**259**	**373**
Dump Master	FW-4	PW-30A	200	-	**1680**	**833**	**452**	**431**	**415**	**286**	**264**	**213** E	**212** E	**390**	**211**	**280**	200	**372**	**551**
Dump Master	FW-4	PW-73B	200	-	1.9	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Non Hot Spot Monitoring Wells																			
Acid Sump	FW-3	PW-10	200	-	125	16.1	16.6	1.23	0.13 J	0.68	0.5 U	0.55	0.5 U	0.5 U	41.9	51.4	25.6	39.1	25.6
Acid Sump	FW-3	PW-14	200	-	1 U														0.5 U
Acid Sump	FW-3	PW-16A	200	-	2.6	4.51	4.33	3.78	1.89	1.2	0.53	0.74	0.5 U	0.5 U	0.5 U	2.89	2.92	0.31 J	0.4 J
Acid Sump	FW-3	PW-19A	200	-	1 U	0.5 U	1.64	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.77	0.5 U	0.5 U	0.5 U
Acid Sump	FW-3	PW-80A	200	-	108	0.19	3.36	2.09	0.49 J	1.25	0.5 U	0.32 J	0.5 U	0.5 U	0.78	5.04	3.66	3.1	10.2
Acid Sump	FW-3	PW-81A	200	-	1 U														0.28 J
Acid Sump	FW-3	PW-82A	200	-	9.4	0.5 U	1.53	1.22	0.77	0.59	0.23 J	0.2 U	0.5 U	0.5 U	0.5 U	1.75	1.23	0.5 U	0.5 U
Acid Sump	FW-3	PW-98A	200	-		**504**	**406**	**507**	183	123	128	6.53	37.8	24.2	1.12	26.5	73.2	**407**	**1000**
Acid Sump	FW-3	FW-6	200	-				8.17	3.18	6.25	1.11	0.2 U	0.98	0.49 J	0.5 U	1.61	2.15	39	0.74
Material Recycle	FW-2	PW-87A	200	-	1.018	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Material Recycle	FW-2	PW-88A	200	-	2.6	0.19 J	0.17 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Amm Sulfate Stg	FW-5	PW-20A	200	-	1 U														0.5 U
Amm Sulfate Stg	FW-5	PW-84A	200	-	18.2	0.26 J	6.43	5.25	2.33	2.81	1.42	1.48	2.37	1.95	1.26	0.48 J	0.48 J	0.44 J	0.38 J
Amm Sulfate Stg	FW-5	PW-89A	200	-	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Amm Sulfate Stg	FW-5	PW-92A	200	-	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Former CCA	FW-1	PW-31A	200	-	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U
Former CCA	FW-1	PW-70AR	200	-	1 U				0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U					0.5 U
Former CCA	FW-1	PW-72A	200	-	2.4											0.5 U	0.5 U	0.5 U	0.5 U
Former CCA	FW-1	PW-101A	200	-				0.08 J	8.93	6.78	5.67	0.3 J	0.5 U	0.5 U	1.25	0.5	0.5 U	0.5 U	0.5 U
Dump Master	FW-4	PW-46A	200	-	1 U	0.18 J	0.15 J	0.5 U	0.5 U	0.5 U	0.5 U	0.46 J	0.5 U	0.35 J	0.5 U	0.2 J	0.52	0.5 U	0.5 U
Dump Master	FW-4	PW-74B	200	-	1.1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dump Master	FW-4	PW-75A	200	-	**311**	64.2	42.6	39.6	27.5	21.3	11.6	13.1	15.9	8.24	12.5	7.26	20.8	10.2	21.7
Dump Master	FW-4	PW-91A	200	-	**391**	8.57	2.74	1.79	1.31	0.54	0.64	16.4 0	0.39 J	10	6.8	3.38	3.59	8.73	6.49
Perimeter Monitoring Wells																			
Acid Sump	FW-3	PW-15AR	200	-	39														0.38 J
Acid Sump	FW-3	PW-76A	200	-	14.8	1.14	1.77	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.1	2.02	0.16 J	0.5 U
Acid Sump	FW-3	PW-77A	200	-	50 U	3.57	4.97	2.15	1.08	1.26	0.53	0.33 J	0.49 J	0.35 J	0.55	5.25	2.05	0.32 J	0.25 J
Acid Sump	FW-3	PW-78A	200	-	22.8	1.79	10.5	9.55	2.18	4.38	0.67	0.5 U	0.5 U	0.5 U	7.37	17.2	12.5	8.55	8
Acid Sump	FW-3	PW-79A	200	-	28.9	0.08 J	8.63	4.19	1.33	4.34	0.69	2.81	0.44 J	0.32 J	2.3	3.07	2.52	0.21 J	0.35 J

Notes:
U = not detected above reporting limit shown
D= Dilution
J = estimated value
E = Estimated value above the calibration range
Blank Cells indicate no analysis performed
= detected value exceeds ROD Standard.
Source of Data through 2015 (GSI 2016d)
Source of Data through 2016 (GSI 2017a)

The fifth five year review covers 2013 through 2017.
Initial GW samples from for PW-98A and PW-99A were collected in July 2009.
Initial GW samples from PW-100A and PW-101A were collected in August 2010.
Initial GW samples from E-11 were collected in May 2010.
Initial GW samples from FW-6 were collected in April 2010.
The Fall 2014 sampling event was conducted in February 2015.
No samples were collected during Fall 2015 due to low water levels

Table A-2
Fabrication Area Monitoring Well Concentrations for 1,1-Dichloroethene (DCE)

Contaminant Source	Extraction Well	Well ID	ROD Standard (MCL)	ROD Standard (1E-06 RBC)	Baseline Fall 2000	Spring 2009	Fall 2009	Spring 2010	Fall 2010	Spring 2011	Fall 2011	Spring 2012	Fall 2012	Spring 2013	Fall 2013	Spring 2014	Fall 2014	Spring 2015	Spring 2016
Hot Spot Monitoring Wells																			
Acid Sump	FW-3	PW-11	7	1800 (a)	118	11.5	1.05	2.11	1.15	1.64	0.73	13.1	12.99	10.84	267	204	34.4	131	214
Acid Sump	FW-3	PW-12	7	1800 (a)	9830	512	522	611	489	235	175	343	1350 E	1280	335	266	233	340	196
Acid Sump	FW-3	PW-13	7	1800 (a)	773	849	432	352	263	189	135	50.7	48.6	46.2	327	520	390	545	95.6
Acid Sump	FW-3	PW-99A	7	1800 (a)		87.8	245	232	186	155	143	135 E	123	125	143	303	145	110	132
Acid Sump	FW-3	E-11	7	1800 (a)				0.5 U	0.52	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.28 J	0.65	0.56	1.87	1.25
Material Recycle	FW-2	PW-42A	7	1800 (a)	69.3	24.3	32.5	30.9	27.6	18.1	13.5	12.5	27	19.7	19	23.9	17.5	11.2	9
Material Recycle	FW-2	PW-85A	7	1800 (a)	76.9	7.31	22.1	18.2	11.8	10.2	8.49	8.12	7.32	9.32	7.33	6.81	3.71	4.44	6.2
Material Recycle	FW-2	PW-86A	7	1800 (a)	169	7.96	0.17 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	3.06	0.5 U	0.5 U
Amm-Sulfate Stg	FW-5	PW-01A	7	1800 (a)	57.7	68.4	1.71	1.22	1.13	0.89	0.51	0.66	24.1	25.5	30.7	11.6	15.6	12.7	13
Amm-Sulfate Stg	FW-5	PW-03A	7	1800 (a)	156	1.33	1.53	1.25	0.72	0.98	0.5 U	0.56	1.33	1.05	1.01	0.68	0.42 J	0.45 J	0.36 J
Amm-Sulfate Stg	FW-5	PW-83A	7	1800 (a)	64	6.76	2.21	1.89	1.26	1.11	0.21 J	0.5 U	2.76	1.36	1.52	2.19	1.49	0.82	0.88
Former CCA	FW-1	PW-45A	7	1800 (a)	164 D	29.3	3.45	2.22	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	4.46	7.42	1.1	3.42	5.15
Former CCA	FW-1	PW-68A	7	1800 (a)	222	1.45	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Former CCA	FW-1	PW-69A	7	1800 (a)	247	29.2	35.4	31.2	44.3	28.4	28.6	5.92	9.73	8.21	13.2	1.25	10.4	8.48	6.28
Former CCA	FW-1	PW-71A	7	1800 (a)	74.2	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.01	0.9	3.23	0.5 U	0.5 U	0.5 U	0.5 U
Former CCA	FW-1	PW-100A	7	1800 (a)				6.09	103	99.9	81.4	43.6	1.85	1.78	0.45 J	0.37 J	0.31 J	0.5 U	0.5 U
Former CCA	FW-7	MW-01A	7	1800 (a)	131	0.12 J	1.4	1.31	0.56	0.89	0.12 J	12.6	15.3	12.8	46.8	36.1	35.6	41.8	25.3
Former CCA	FW-7	MW-02A	7	1800 (a)	455	71	62.1	58.2	52.8	41.3	35.6	52.9	30	24.3	29.1	26.8	0.5 U	12.5	8.38
Former CCA	FW-7	MW-03A	7	1800 (a)	9.6	0.12 J	0.12 J	0.5 U	0.5 U	0.5 U	0.5 U	0.2	0.5 U	0.5 U	0.5 U	0.5 U	21.9	0.5 U	0.5 U
Former CCA	FW-7	MW-04A	7	1800 (a)	224	44.8	38.6	35.4	28.6	22.2	12.4	21	56.5	52.6	33.3	28.1	26	24.4	8.5 J
Former CCA	FW-7	PW-93A	7	1800 (a)		918	638	905	512	785	315	1280	140	128	16.2	9.77	11.8	17.2	7.54
Former CCA	FW-7	PW-94A	7	1800 (a)		2.11	5.45	1.9	11.1	0.23 J	8.12	4.04	5.16	4.99	10.1	71	97.3	90.8	116
Former CCA	FW-7	PW-95A	7	1800 (a)		296	13.7	15.2	15.5	8.18	12.3		9.56	9.21	10.5	4.55	43.9	19.9	28.8
Dump Master	FW-4	PW-30A	7	1800 (a)	117	42.5	21.9	18.8	12.2	7.5	8.4	16.2	9.96	26.6	17.1	22.2	14.4	23.1	33.3
Dump Master	FW-4	PW-73B	7	1800 (a)	56.8	4.77	7.86	6.98	4.18	5.11	1.28	3.81	0.89	1.46	1.77	1.64	1.52	0.5 U	1.89
Non Hot Spot Monitoring Wells																			
Acid Sump	FW-3	PW-10	7	1800 (a)	18.6	1.91	1.17	2.55	3.51	1.45	1.38	0.79	0.58	0.49 J	4.73	6.06	2.72	3.76	2.3
Acid Sump	FW-3	PW-14	7	1800 (a)	1 U														0.5 U
Acid Sump	FW-3	PW-16A	7	1800 (a)	1.7	3.04	1.75	0.61	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.29 J
Acid Sump	FW-3	PW-19A	7	1800 (a)	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Acid Sump	FW-3	PW-80A	7	1800 (a)	93.6	0.2	2.21	0.99	0.25 J	0.88	0.5 U	0.64	0.5 U	0.5 U	0.86	2.45	0.57	1.33	8.26
Acid Sump	FW-3	PW-81A	7	1800 (a)	1 U														7.53
Acid Sump	FW-3	PW-82A	7	1800 (a)	9.3	0.5 U	0.15 J	0.5 U	0.5 U	0.5 U	0.5 U	0.2	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Acid Sump	FW-3	PW-98A	7	1800 (a)		1080	1070	495	427	125	245	31.8	134 E	126	28.3	110	203	651	1110
Acid Sump	FW-3	FW-6	7	1800 (a)				4.82	0.5 U	0.18 J	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	3.38	0.5 U
Material Recycle	FW-2	PW-87A	7	1800 (a)	1.4	0.49 J	0.52	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.24 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Material Recycle	FW-2	PW-88A	7	1800 (a)	1 U	0.5 U	0.14 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Amm Sulfate Stg	FW-5	PW-20A	7	1800 (a)	1 U														0.5 U
Amm Sulfate Stg	FW-5	PW-84A	7	1800 (a)	22.9	5.19	4.23	3.98	2.56	2.58	0.54	1.46	8.24	8.82	7.01	7.62	5.9	6.45	5.78
Amm Sulfate Stg	FW-5	PW-89A	7	1800 (a)	3.5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Amm Sulfate Stg	FW-5	PW-92A	7	1800 (a)	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Former CCA	FW-1	PW-31A	7	1800 (a)	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U
Former CCA	FW-1	PW-70AR	7	1800 (a)	1 U				0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U					0.5 U
Former CCA	FW-1	PW-72A	7	1800 (a)	2.2											0.5 U	0.5 U	0.5 U	0.5 U
Former CCA	FW-1	PW-101A	7	1800 (a)				0.16	286	183	64.8	0.33 J	0.5 U	0.5 U	0.55	0.35 J	0.5 U	0.5 U	0.5 U
Dump Master	FW-4	PW-46A	7	1800 (a)	9.2	7.22	7.47	6.94	5.69	3.14	3.48	5.71	2.14	4.33	0.5 U	2.16	0.5 U	0.5 U	0.5 U
Dump Master	FW-4	PW-74B	7	1800 (a)	5.1	0.5 U	2.22	1.82	1.25	0.76	0.63	2.84	0.51	2.22	1.12	0.82	1.66	1	1.02
Dump Master	FW-4	PW-75A	7	1800 (a)	51.4	7.08	6.36	5.78	5.18	3.16	3.67	2.9	2.63	2.34	2.88	1.72	2.11	1.61	1.99
Dump Master	FW-4	PW-91A	7	1800 (a)	70.6	2.54	1.15	0.88	0.69	0.76	0.33 J	3.28	0.5 U	2.5	2.63	1.74	1.02	1.78	1.97
Perimeter Monitoring Wells																			
Acid Sump	FW-3	PW-15AR	7	1800 (a)	5 U														0.2 J
Acid Sump	FW-3	PW-76A	7	1800 (a)	6.9	0.18 J	0.2 J	0.54	0.5 U	0.26 J	0.5 U	0.5 U	0.5 U	0.5 U	0.22 J	0.5 U	0.5 U	0.5 U	0.5 U
Acid Sump	FW-3	PW-77A	7	1800 (a)	90.7	30.8	34.4	33.8	26.5	26.4	18.4	16.3	14.8	12.4	18.8	16.3	15.4	18.3	16
Acid Sump	FW-3	PW-78A	7	1800 (a)	67	71.3	83.8	68.7	57.6	42.3	46.2	38.2	34.2	31.3	74.7	69	77.3	84.1	66.3
Acid Sump	FW-3	PW-79A	7	1800 (a)	16.6	2.05	5.47	3.09	2.64	1.56	0.76	0.72	0.61	0.59	5.42	3.66	0.5 U	1.14	2.54

Notes:
(a) Risked based value based on industrial worker tap water ingestion pathway
U = not detected above reporting limit shown
D= Dilution
J = estimated value
E = Estimated value above the calibration range
Blank Cells indicate no analysis performed
= detected value exceeds ROD Standard.
Source of Data through 2015 (GSI 2016d)
Source of Data through 2016 (GSI 2017a)

The fifth five year review covers 2013 through 2017.
Initial GW samples from for PW-98A and PW-99A were collected in July 2009.
Initial GW samples from PW-100A and PW-101A were collected in August 2010.
Initial GW samples from E-11 were collected in May 2010.
Initial GW samples from FW-6 were collected in April 2010.
The Fall 2014 sampling event was conducted in February 2015.
No samples were collected during Fall 2015 due to low water levels

Table A-3
Fabrication Area Monitoring Well Concentrations for Trichloroethene (TCE)

Contaminant Source	Extraction Well	Well ID	ROD Standard (MCL)	ROD Standard (1E-06 RBC)	Baseline Fall 2000	Spring 2009	Fall 2009	Spring 2010	Fall 2010	Spring 2011	Fall 2011	Spring 2012	Fall 2012	Spring 2013	Fall 2013	Spring 2014	Fall 2014	Spring 2015	Spring 2016
Hot Spot Monitoring Wells																			
Acid Sump	FW-3	PW-11	5	-	**13.9**	3.86	0.23 J	0.5 U	0.5 U	0.5 U	0.5 U	3.38	2.31	1.02	**22.6**	4.78 J	2.08	2.44	3.5
Acid Sump	FW-3	PW-12	5	-	**186**	**18.3**	**8.12**	**5.52**	1.02 J	2.5 U	2.5 U	**12.4**	**19.8**	**16.2**	**153**	**134**	**128**	**143**	**98.8**
Acid Sump	FW-3	PW-13	5	-	**14.1**	**19.5**	**7.27**	**10.1**	2.5 U	1.2 J	2.5 U	1.27	1.21	1.03	**9**	**16.2** J	**13.6** J	**15.7**	2.19
Acid Sump	FW-3	PW-99A	5	-		0.77	1.04	0.23 J	0.5 U	0.5 U	0.5 U	**50.5**	**49.6**	**41.3**	1.08	**72.6**	**46.7**	0.52	0.82
Acid Sump	FW-3	E-11	5	-				0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Material Recycle	FW-2	PW-42A	5	-	**112**	**6.76**	**12.8**	**8.7**	**6.2**	**5.7**	3.7	2.65	**28.6**	2.03	**142**	1.3	4.21	**28**	**8.47**
Material Recycle	FW-2	PW-85A	5	-	4.3	**6.11**	2.09	1.89	0.68	0.81	0.23 J	0.61	1.76	2.21	1.85	1.75	1.09	2.16	**7.74**
Material Recycle	FW-2	PW-86A	5	-	**373**	**164**	3.97	3.56	0.74	2.41	0.47 J	1.11	0.98	0.72	1.05	0.32 J	**57.7**	0.52	0.22 J
Amm-Sulfate Stg	FW-5	PW-01A	5	-	**5.5**	**5.23**	1.38	0.56	0.5 U	0.33 J	0.5 U	0.5 U	2.26	2	2.18	1.42	1.56	1.43	0.94
Amm-Sulfate Stg	FW-5	PW-03A	5	-	**6.4**	0.16 J	0.15 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Amm-Sulfate Stg	FW-5	PW-83A	5	-	1.8	0.34 J	0.11 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Former CCA	FW-1	PW-45A	5	-	3.5	0.37 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Former CCA	FW-1	PW-68A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Former CCA	FW-1	PW-69A	5	-	**11.2**	**5.48**	2.32 J	**5.3**	4.23	3.96	1.96	2 U	1.37	1.26	1.04	0.18 J	5 U	0.43 J	0.24 J
Former CCA	FW-1	PW-71A	5	-	**13.6**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.52	0.46 J	0.45 J	0.5 U	0.5 U	0.5 U	0.5 U
Former CCA	FW-1	PW-100A	5	-				**43**	**5.37**	**5.11**	4.81	2.96	0.37 J	0.33 J	0.3 J	0.5 U	0.5 U	0.5 U	0.73
Former CCA	FW-7	MW-01A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Former CCA	FW-7	MW-02A	5	-	2.4	0.54	0.35 J	0.2 J	0.5 U	0.5 U	0.5 U	0.42 J	0.26 J	0.21 J	0.32 J	0.33 J	0.5 U	0.2 J	0.17 J
Former CCA	FW-7	MW-03A	5	-	1 U	0.11 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.34 J	0.5 U	0.5 U
Former CCA	FW-7	MW-04A	5	-	1 U	0.24 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Former CCA	FW-7	PW-93A	5	-		**60.3**	**157**	**16.7** J	**29.4**	2.13 J	**17.4**	**31.3**	2.71	2.54	1.16	5 U	0.25 J	0.2 J	0.16 J
Former CCA	FW-7	PW-94A	5	-		0.32 J	0.21 J	0.31 J	0.23 J	0.5 U	0.5 U	0.26 J	0.28 J	0.5 U	2.88	**25** U	**25** U	1.58 J	4.29 J
Former CCA	FW-7	PW-95A	5	-		**9.94**	1.41	2.3	0.68	1.9	0.23 J		0.46 J	0.5 U	1.43	0.51	**25** U	0.65	0.86
Dump Master	FW-4	PW-30A	5	-	5	2.17	0.85 J	1.1 U	1.1 U	1.1 U	1.1 U	0.64	0.52	1.16	0.77	5 U	5 U	0.95	1.21
Dump Master	FW-4	PW-73B	5	-	**31**	2.15	3.46	2.52	1.29	0.89	0.26 J	3.4	0.5 U	1.35	1.65	1.53	1.63	0.5 U	2.14
Non Hot Spot Monitoring Wells																			
Acid Sump	FW-3	PW-10	5	-	**6**	2.07	1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.55	1.63	1.89	2.04	1.04
Acid Sump	FW-3	PW-14	5	-	1 U														0.5 U
Acid Sump	FW-3	PW-16A	5	-	1 U	1.2	0.57	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Acid Sump	FW-3	PW-19A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Acid Sump	FW-3	PW-80A	5	-	**19.7**	0.09	0.48 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.28 J	0.5 U	0.32 J	1.14
Acid Sump	FW-3	PW-81A	5	-	1 U														1.41
Acid Sump	FW-3	PW-82A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Acid Sump	FW-3	PW-98A	5	-		**336**	**150**	**108**	**26.3**	**46.1**	**18.4**	0.2 U	1	0.78	**8.1**	5 U	5 U	**52.1**	**59.9**
Acid Sump	FW-3	FW-6	5	-				0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.99	0.5 U
Material Recycle	FW-2	PW-87A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Material Recycle	FW-2	PW-88A	5	-	1 U	0.5 U	0.39 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.29 J	0.46 J	0.5 U	0.5 U	0.5 U	0.5 U
Amm Sulfate Stg	FW-5	PW-20A	5	-	1 U														0.5 U
Amm Sulfate Stg	FW-5	PW-84A	5	-	1.2	**10.4**	3.93	3.34	1.69	1.48	0.67	1.11	**5.89**	**6.35**	**5.68**	**8.38**	2.96	**6.51**	4.81
Amm Sulfate Stg	FW-5	PW-89A	5	-	**20.3**	0.9	0.86	0.77	0.62	0.26 J	0.5 U	0.5 U	0.5 U	0.88	1.07	1.57	1.29	0.78	0.34 J
Amm Sulfate Stg	FW-5	PW-92A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Former CCA	FW-1	PW-31A	5	-	1 U	0.1 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U
Former CCA	FW-1	PW-70AR	5	-	1 U				0.17 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U					0.5 U
Former CCA	FW-1	PW-72A	5	-	1 U											0.5 U	0.5 U	0.5 U	0.5 U
Former CCA	FW-1	PW-101A	5	-				0.12 J	4.02	3.89	1.84	0.32 J	0.61	0.59	0.5 U	0.17 J	0.5 U	0.44 J	0.28 J
Dump Master	FW-4	PW-46A	5	-	**5.2**	4.18	3.68	3.33	2.11	1.86	1.89	2.96	1.34	2.4	0.5 U	1.19	0.5 U	0.5 U	0.5 U
Dump Master	FW-4	PW-74B	5	-	3.7	0.5 U	0.82	0.67	0.5 U	0.33 J	0.5 U	1.26	0.5 U	1.03	0.56	0.36 J	0.81	0.5	0.53
Dump Master	FW-4	PW-75A	5	-	**6.3**	0.49 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dump Master	FW-4	PW-91A	5	-	4.3	0.33 J	0.2 J	0.5 U	0.5 U	0.5 U	0.5 U	0.39 J	0.5 U	0.25 J	0.5 U	0.27 J	0.65	0.21 J	0.27 J
Perimeter Monitoring Wells																			
Acid Sump	FW-3	PW-15AR	5	-	5 U														0.5 U
Acid Sump	FW-3	PW-76A	5	-	1 U	0.16 J	0.42 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.35 J	0.35 J	0.27 J	0.5 U	0.5 U
Acid Sump	FW-3	PW-77A	5	-	**50** U	3.09	2.44	1.98	1.72	1.45	0.69	0.31 J	0.24 J	0.18 J	1.98	1.91	1.96	1.84	1.83
Acid Sump	FW-3	PW-78A	5	-	2 U	2.05	1.73	1.94	0.75	0.63	0.55	0.5 U	0.21 J	0.5 U	1.96	2.00	2.33	2.29	1.96
Acid Sump	FW-3	PW-79A	5	-	1.4	0.5 U	0.58	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.21	0.91	0.5 U	0.19 J	0.44 J

Notes:
U = not detected above reporting limit shown
D= Dilution
J = estimated value
E = Estimated value above the calibration range
Blank Cells indicate no analysis performed
= detected value exceeds ROD Standard
Source of Data through 2015 (GSI 2016d)
Source of Data through 2016 (GSI 2017a)

The fifth five year review covers 2013 through 2017.
Initial GW samples from for PW-98A and PW-99A were collected in July 2009.
Initial GW samples from PW-100A and PW-101A were collected in August 2010.
Initial GW samples from E-11 were collected in May 2010.
Initial GW samples from FW-6 were collected in April 2010.
The Fall 2014 sampling event was conducted in February 2015.
No samples were collected during Fall 2015 due to low water levels

Table A-4
Fabrication Area Monitoring Well Concentrations for Tetrachloroethene (PCE)

Contaminant Source	Extraction Well	Well ID	ROD Standard (MCL)	ROD Standard (1E-06 RBC)	Baseline Fall 2000	Spring 2009	Fall 2009	Spring 2010	Fall 2010	Spring 2011	Fall 2011	Spring 2012	Fall 2012	Spring 2013	Fall 2013	Spring 2014	Fall 2014	Spring 2015	Spring 2016
Hot Spot Monitoring Wells																			
Acid Sump	FW-3	PW-11	5	-	3.3	0.96	0.33 J	0.5 U	0.5 U	0.5 U	0.5 U	0.98	0.77	0.67	**5.55**	5 U	1.32	0.94	0.88
Acid Sump	FW-3	PW-12	5	-	**34.2**	**9.21**	3.94	2.5 U	2.5 U	2.5 U	2.5 U	**7.27**	4.35	3.33	**7.05**	**25** U	**25** U	**6.67**	4.22
Acid Sump	FW-3	PW-13	5	-	2.8	3.5 J	1.35 J	2.1 J	2.5 U	2.5 U	2.5 U	0.33 J	0.5 U	0.5 U	1.87 J	**25** U	**25** U	3.16 J	0.54
Acid Sump	FW-3	PW-99A	5	-		0.21 J[(2)]	0.37 J	0.5 U	0.5 U	0.5 U	0.5 U	3.68	3.55	2.78	0.31 J	1.83 J	5 U	0.18 J	0.26 J
Acid Sump	FW-3	E-11	5	-				0.5 U[(	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Material Recycle	FW-2	PW-42A	5	-	2.5	0.08 J	0.41 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.59	0.5 U	2.56	0.5 U	0.5 U	0.25 J	0.5 U
Material Recycle	FW-2	PW-85A	5	-	1 U	0.18 J	0.26 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.68	0.81	0.72	0.65	0.33 J	0.46 J	0.35 J
Material Recycle	FW-2	PW-86A	5	-	2.8	3.21	0.41 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.46	0.5 U	0.5 U
Amm-Sulfate Stg	FW-5	PW-01A	5	-	1 U	0.5 U	0.33 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Amm-Sulfate Stg	FW-5	PW-03A	5	-	1.1	0.1 J	0.1 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Amm-Sulfate Stg	FW-5	PW-83A	5	-	1 U	0.5 U	0.09 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Former CCA	FW-1	PW-45A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Former CCA	FW-1	PW-68A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Former CCA	FW-1	PW-69A	5	-	**8.6**	**15.5**	**10.5**	**8.21**	**6.69**	**7.12**	4.26	**5.71**	**8.55**	**7.68**	**5.06**	0.48 J	4 J	3.61	2.13
Former CCA	FW-1	PW-71A	5	-	2.2	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Former CCA	FW-1	PW-100A	5	-				**7.23**	2.99	2.46	1.45	4.14	0.49 J	0.41 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Former CCA	FW-7	MW-01A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Former CCA	FW-7	MW-02A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Former CCA	FW-7	MW-03A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Former CCA	FW-7	MW-04A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Former CCA	FW-7	PW-93A	5	-		**40**	**79**	**31.5**	**5.26** J	**14.3**	1.18 J	**19**	3.92	3.12	0.98	5 U	0.32 J	0.35 J	0.22 J
Former CCA	FW-7	PW-94A	5	-		0.12 J	0.19 J	0.5 U	0.1 J	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	1.16	**25** U	**25** U	1.31 J	**5.7**
Former CCA	FW-7	PW-95A	5	-		4.28	1.72	1.51	1.12	0.65	0.78		1.67	1.25	1.22	3.27	**25** U	0.68	1.06
Dump Master	FW-4	PW-30A	5	-	1.3	0.68 J	0.32 J	1.1 U	1.1 U	1.1 U	1.1 U	0.22 J	0.22 J	0.4 J	0.5 U	5 U	5 U	0.31 J	0.33 J
Dump Master	FW-4	PW-73B	5	-	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Non Hot Spot Monitoring Wells																			
Acid Sump	FW-3	PW-10	5	-	2.1	0.52	0.6	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.79	1.91	0.79	1.75	1.2
Acid Sump	FW-3	PW-14	5	-	1 U														0.5 U
Acid Sump	FW-3	PW-16A	5	-	1 U	0.29 J	0.21 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Acid Sump	FW-3	PW-19A	5	-	1 U	0.09 J	0.1 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Acid Sump	FW-3	PW-80A	5	-	3.2	0.5 U	0.14 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.45 J
Acid Sump	FW-3	PW-81A	5	-	1 U														0.4 J
Acid Sump	FW-3	PW-82A	5	-	1 U	0.15 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Acid Sump	FW-3	PW-98A	5	-		**16.3**	**8.46**	**6.84**	3.59	3.11	1.57	0.2 U	0.25 J	0.5 U	0.8	5 U	5 U	2.66	4.51
Acid Sump	FW-3	FW-6	5	-				0.44 J	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.68	0.5 U
Material Recycle	FW-2	PW-87A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Material Recycle	FW-2	PW-88A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Amm Sulfate Stg	FW-5	PW-20A	5	-	1 U														0.5 U
Amm Sulfate Stg	FW-5	PW-84A	5	-	1 U	0.1 J	0.31 J	0.11 J	0.5 U	0.5 U	0.5 U	0.5 U	0.69	0.72	0.49 J	0.29 J	0.4 J	0.32 J	0.27 J
Amm Sulfate Stg	FW-5	PW-89A	5	-	1.1	0.31 J	0.16 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.23 J	0.5 U	0.23 J	0.2 J	0.16 J	0.2 J
Amm Sulfate Stg	FW-5	PW-92A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Former CCA	FW-1	PW-31A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U
Former CCA	FW-1	PW-70AR	5	-	1 U				0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U					0.5 U
Former CCA	FW-1	PW-72A	5	-	1 U											0.5 U	0.5 U	0.5 U	0.5 U
Former CCA	FW-1	PW-101A	5	-				0.5 U	**5.28**	3.89	4.18	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dump Master	FW-4	PW-46A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dump Master	FW-4	PW-74B	5	-	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dump Master	FW-4	PW-75A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dump Master	FW-4	PW-91A	5	-	1 U	0.08 J	0.4 J	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.54	0.5 U	0.5 U
Perimeter Monitoring Wells																			
Acid Sump	FW-3	PW-15AR	5	-	5 U														0.5 U
Acid Sump	FW-3	PW-76A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Acid Sump	FW-3	PW-77A	5	-	**50** U	0.47 J	0.42 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.27 J	0.26 J	0.23 J	0.19 J	0.21 J
Acid Sump	FW-3	PW-78A	5	-	2 U	0.68	0.6	0.72	0.5 U	0.44 J	0.5 U	0.5 U	0.5 U	0.5 U	0.65	0.52	0.75	0.75	0.61
Acid Sump	FW-3	PW-79A	5	-	1 U	0.5 U	0.15 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.22 J	0.5 U	0.5 U	0.5 U	0.5 U

Notes:
U = not detected above reporting limit shown
D= Dilution
J = estimated value
E = Estimated value above the calibration range
Blank Cells indicate no analysis performed
= detected value exceeds ROD Standard.
Source of Data through 2015 (GSI 2016d)
Source of Data through 2016 (GSI 2017a)

The fifth five year review covers 2013 through 2017.
Initial GW samples from for PW-98A and PW-99A were collected in July 2009.
Initial GW samples from PW-100A and PW-101A were collected in August 2010.
Initial GW samples from E-11 were collected in May 2010.
Initial GW samples from FW-6 were collected in April 2010.
The Fall 2014 sampling event was conducted in February 2015.
No samples were collected during Fall 2015 due to low water levels

Table A-5
Fabrication Area Monitoring Well Concentrations for Vinyl Chloride (VC)

Contaminant Source	Extraction Well	Well ID	ROD Standard (MCL)	ROD Standard (1E-06 RBC)	Baseline Fall 2000	Spring 2009	Fall 2009	Spring 2010	Fall 2010	Spring 2011	Fall 2011	Spring 2012	Fall 2012	Spring 2013	Fall 2013	Spring 2014	Fall 2014	Spring 2015	Spring 2016
Hot Spot Monitoring Wells																			
Acid Sump	FW-3	PW-11	2	-	1.2	0.43 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	4.75	4.61	4.19	19.4	2.54 J	0.5 U	1.66	3.93
Acid Sump	FW-3	PW-12	2	-	29.3	15.1	12	10.1	8.1	4.3	6.3	25.7	390	377	21.5	25.4	24.3 J	36.1	22.6
Acid Sump	FW-3	PW-13	2	-	11.1	4.62 J	2.73	2.43 J	2.13 J	2.5 U	1.11 J	2.23	2.15	1.98	0.5 U	25 U	25 U	5 U	1.53
Acid Sump	FW-3	PW-99A	2	-		0.32 J	1.53	4.23	5.33	2.48	2.84	12.3	11.1	9.82	0.45 J	5.63	10.9	0.42 J	0.72
Acid Sump	FW-3	E-11	2	-				0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.46 J	0.5 U
Material Recycle	FW-2	PW-42A	2	-	4.9	5.14	2.99	2.59	2.11	2.11	0.84	1.13	2.43	5.23	0.69	2.45	1.68	1.27	1.42
Material Recycle	FW-2	PW-85A	2	-	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Material Recycle	FW-2	PW-86A	2	-	45.8	7.62	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	3.21	0.5 U	0.5 U
Amm-Sulfate Stg	FW-5	PW-01A	2	-	28.4	23.4	0.77	0.61	0.51	0.43 J	0.42 J	0.5 U	10.9	13.3	10.4	8.51	8.21	6	5.85
Amm-Sulfate Stg	FW-5	PW-03A	2	-	4.2	0.5 U	0.17 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Amm-Sulfate Stg	FW-5	PW-83A	2	-	4.7	1.65	0.82	0.67	0.43 J	0.33 J	0.11 J	0.5 U	2.34	0.88	0.83	1.14	0.77	0.43 J	0.53
Former CCA	FW-1	PW-45A	2	-	29	0.33 J	0.15 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	3.62	0.5 U	0.9	10
Former CCA	FW-1	PW-68A	2	-	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Former CCA	FW-1	PW-69A	2	-	3.7	3.18 J	4.76 J	4.8 J	1.06	3.8 J	0.43 J	2 U	2.06	1.88	3.19	0.28 J	1.77 J	1.42	1.03
Former CCA	FW-1	PW-71A	2	-	3.2	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Former CCA	FW-1	PW-100A	2	-				5.18	19.9	16.8	7.64	6.44	1.05	1.04	2.03	4.12	0.97	0.67	14.2
Former CCA	FW-7	MW-01A	2	-	36.3	0.5 U	0.9	0.99	0.82	0.62	0.61	2.89	1.47	1.36	13.4	10.5	5.3	13.6	8.6
Former CCA	FW-7	MW-02A	2	-	166	68.2	109	52.7	36.5	42.1	16.4	49.2	21.4	19.6	53.6	46.8	0.5 U	47.5	42.3
Former CCA	FW-7	MW-03A	2	-	1.1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	25.8	0.5 U	0.5 U
Former CCA	FW-7	MW-04A	2	-	29.3	9.23	10.2	8.51	7.93	6.21	5.41	5.06	30.1	26.5	9.68	7.57	8.71	8.6	3.26 J
Former CCA	FW-7	PW-93A	2	-		31.3	14.7	13.5 J	10	25 U	10 U	88.4	41.4	38.3	7.43	5.07	2.49	4.1	2.51
Former CCA	FW-7	PW-94A	2	-		1.63	1.54	1.7	1.39	0.68	0.81	0.67	0.76	0.71	2.24	25 U	25 U	2.23 J	1.93 J
Former CCA	FW-7	PW-95A	2	-		1.98	5.75	3.8	0.24 J	2.1	0.5 U		0.84	0.76	3.16	1.43	25 U	1.04	1.41
Dump Master	FW-4	PW-30A	2	-	1 U	0.24 J	1.1 U	1.1	1.1 U	1.1 U	1.1 U	0.2 U	0.5 U	0.5 U	0.5 U	5 U	5 U	0.5 U	0.5 U
Dump Master	FW-4	PW-73B	2	-	8.3	5.14	9.36	7.62	6.85	6.58	3.48	2.54	2.45	1.76	2.1	1.44	1.64	0.5 U	1.65
Non Hot Spot Monitoring Wells																			
Acid Sump	FW-3	PW-10	2	-	1 U	0.13 J	0.5 U		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Acid Sump	FW-3	PW-14	2	-	1 U														0.5 U
Acid Sump	FW-3	PW-16A	2	-	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Acid Sump	FW-3	PW-19A	2	-	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Acid Sump	FW-3	PW-80A	2	-	1.2	0.5 U	0.23 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.77
Acid Sump	FW-3	PW-81A	2	-	1 U														0.41 J
Acid Sump	FW-3	PW-82A	2	-	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Acid Sump	FW-3	PW-98A	2	-		8.86	131		78.2	25.3	34.4	0.23 J	0.6	0.54	2.56	5 U	5 U	13	52.1
Acid Sump	FW-3	FW-6	2	-				0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Material Recycle	FW-2	PW-87A	2	-	1 U	0.93	1.35	1.12	0.98	0.89	0.34 J	0.55	0.5 U	0.68	0.28 J	0.5 U	0.29 J	0.29 J	0.31 J
Material Recycle	FW-2	PW-88A	2	-	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Amm Sulfate Stg	FW-5	PW-20A	2	-	1 U														0.5 U
Amm Sulfate Stg	FW-5	PW-84A	2	-	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Amm Sulfate Stg	FW-5	PW-89A	2	-	1.2	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Amm Sulfate Stg	FW-5	PW-92A	2	-	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Former CCA	FW-1	PW-31A	2	-	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U
Former CCA	FW-1	PW-70AR	2	-	1 U				0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U					0.5 U
Former CCA	FW-1	PW-72A	2	-	1 U											0.5 U	0.5 U	0.5 U	0.5 U
Former CCA	FW-1	PW-101A	2	-				0.5 U	36.5	31.2	26.4	0.2 U	1.05	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dump Master	FW-4	PW-46A	2	-	1 U	1.65	2.28	2.03	1.99	1.89	1.32	1.62	0.63	1.19	0.5 U	0.62	0.5 U	0.5 U	0.5 U
Dump Master	FW-4	PW-74B	2	-	1 U	0.5 U	0.53	0.49 J	0.5 U	0.5 U	0.5 U	0.66	0.5 U	0.82	0.36 J	0.31 J	0.75	0.44 J	0.34 J
Dump Master	FW-4	PW-75A	2	-	1.8	0.5 U	0.13 J	0.5 U	0.12 J	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dump Master	FW-4	PW-91A	2	-	3	0.35 J	0.24 J	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Perimeter Monitoring Wells																			
Acid Sump	FW-3	PW-15AR	2	-	5 U														0.5 U
Acid Sump	FW-3	PW-76A	2	-	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Acid Sump	FW-3	PW-77A	2	-	50 U	0.49 J	3.61	3.15	2.86	1.89	1.13	0.41 J	0.72	0.69	1.26	0.5 U	0.37 J	0.2 J	0.6
Acid Sump	FW-3	PW-78A	2	-	2 U	0.14 J	0.36 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 J	0.5 U	0.26 J	0.28 J
Acid Sump	FW-3	PW-79A	2	-	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

Notes:
U = not detected above reporting limit shown
D= Dilution
J = estimated value
E = Estimated value above the calibration range
Blank Cells indicate no analysis performed
= detected value exceeds ROD Standard.
= detection limit greater than ROD Standard
Source of Data through 2015 (GSI 2016d)
Source of Data through 2016 (GSI 2017a)

The fifth five year review covers 2013 through 2017.
Initial GW samples from for PW-98A and PW-99A were collected in July 2009.
Initial GW samples from PW-100A and PW-101A were collected in August 2010.
Initial GW samples from E-11 were collected in May 2010.
Initial GW samples from FW-6 were collected in April 2010.
The Fall 2014 sampling event was conducted in February 2015.
No samples were collected during Fall 2015 due to low water levels

Table A-6
Fabrication Area Monitoring Well Concentrations for 1, 1 -Dichloroethane (DCA)

Contaminant Source	Extraction Well	Well ID	ROD Standard (MCL)	ROD Standard (1E-06 RBC)	Baseline Fall 2000	Spring 2009	Fall 2009	Spring 2010	Fall 2010	Spring 2011	Fall 2011	Spring 2012	Fall 2012	Spring 2013	Fall 2013	Spring 2014	Fall 2014	Spring 2015	Spring 2016
Hot Spot Monitoring Wells																			
Acid Sump	FW-3	PW-11	-	3700 (a)	54.3	3.77	3.79	0.5 U	8.15	2.68	3.12	31.6	29.6	24.8	80.8	52.9	16.3	31.8	86.3
Acid Sump	FW-3	PW-12	-	3700 (a)	901	321	255	2.5 U	312	189	289	296	774 E	725	299	335	236	426	199
Acid Sump	FW-3	PW-13	-	3700 (a)	1660	3310	1710	0.77 J	1524	789	1125	117 E	112	105	1280	2400	1970	3030	308
Acid Sump	FW-3	PW-99A	-	3700 (a)		28.5	60.6	0.5 U	23.9	41.5	14.8	56.6	52.3	49.1	37.3	54.8	46.9	15.9	32.5
Acid Sump	FW-3	E-11	-	3700 (a)				0.5 U	0.5 U	0.5 U	0.5 U	0.43 J	0.46 J	0.5 U	0.25 J	0.55	0.53	1.43	0.81
Material Recycle	FW-2	PW-42A	-	3700 (a)	21.8	5.52	4.72	0.5 U	3.37	2.01	0.84	1.89	3.07	2.09	2.2 J	1.91	1.61	1.26	1.4
Material Recycle	FW-2	PW-85A	-	3700 (a)	17.4	6.06	11.2	0.5 U	8.26	4.18	5.54	3.15	3.86	4.28	3.5	3.59	2.27	2.34	1.66
Material Recycle	FW-2	PW-86A	-	3700 (a)	243	3.97	0.52	0.5 U	0.5 U	0.11 J	0.5 U	0.5 U	0.5 U	0.5 U	0.42 J	0.17 J	0.89	0.5 U	0.5 U
Amm-Sulfate Stg	FW-5	PW-01A	-	3700 (a)	24.3	27.2	1.07	0.5 U	0.98	0.88	0.55	0.72	14	12.7	12.7	9.17	10.1	9.14	7.61
Amm-Sulfate Stg	FW-5	PW-03A	-	3700 (a)	49.9	0.49 J	0.51	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.38 J	0.3 J	0.29 J	0.26 J	0.18 J	0.17 J	0.5 U
Amm-Sulfate Stg	FW-5	PW-83A	-	3700 (a)	11.4	2	0.57	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.89	0.51	0.51	0.87	0.5	0.24 J	0.3 J
Former CCA	FW-1	PW-45A	-	3700 (a)	128 DL	2.06	0.22 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.21 J	0.62	0.5 U	0.35 J	1.29
Former CCA	FW-1	PW-68A	-	3700 (a)	53.1	4.95	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Former CCA	FW-1	PW-69A	-	3700 (a)	648	234	299	5 U	141	189	135	56.8	100	97.3	149	11.3	38.3	38	31.5
Former CCA	FW-1	PW-71A	-	3700 (a)	51.4	0.12 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.56	1.32	0.56	0.5 U	0.5 U	0.5 U	0.5 U
Former CCA	FW-1	PW-100A	-	3700 (a)				5.5 (3)	2250	2100	1850	222	10.7	10.2	2.78	3.18	2.54	2.2	0.99
Former CCA	FW-7	MW-01A	-	3700 (a)	58.2	0.5 U	0.28 J	0.5 U	0.5 U	0.5 U	0.5 U	5.14	6.97	6.59	17.6	14	13.5	15.2	8.2
Former CCA	FW-7	MW-02A	-	3700 (a)	154	4.69	3.81	0.55	4.89	3.81	1.25	4.43	2.11	2.02	1.81	1.87	0.5 U	1.53	1.32
Former CCA	FW-7	MW-03A	-	3700 (a)	2.806	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	1.54	0.5 U	0.5 U
Former CCA	FW-7	MW-04A	-	3700 (a)	75	5.35	4.82	0.5 U	4.68	2.84	2.11	2.07	3.36	3.18	1.96	2.16	1.6	1.81	0.65 J
Former CCA	FW-7	PW-93A	-	3700 (a)		2670	1130	25	9770	3380	6218	3150 E	185	166	171	83.4	58	83.1	59.2
Former CCA	FW-7	PW-94A	-	3700 (a)		24.3	88.3	0.5 U	125	8.96	81	43.3	60.1	58.2	75.4	118	121	166	187
Former CCA	FW-7	PW-95A	-	3700 (a)		335	108	0.5 U	60.6	3.16	45.1		43.9	41.6	50.2	40.3	79.8	45.8	63.7
Dump Master	FW-4	PW-30A	-	3700 (a)	34.4	20.2	10.2	1.1 U	5.6	4.5	3.9	4.54	4.25	7.54	4.57	5.51	4.23 J	7.05	10.6
Dump Master	FW-4	PW-73B	-	3700 (a)	41.6	2.83	4.51	0.5 U	3.54	1.18	1.65	2.85	1.11	1.17	1.43	1.23	1.25	0.5 U	1.4
Non Hot Spot Monitoring Wells																			
Acid Sump	FW-3	PW-10	-	3700 (a)	327	58.8	31.8	0.5 U	35.1	23.9	22.2	18.1	15.6	14.9	67.5	81.3	60.9	77.5	26.7
Acid Sump	FW-3	PW-14	-	3700 (a)	2.2														0.5 U
Acid Sump	FW-3	PW-16A	-	3700 (a)	1 U	1.12	0.69	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.6	0.28 J	0.24 J	0.34 J	0.36 J
Acid Sump	FW-3	PW-19A	-	3700 (a)	1.7	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Acid Sump	FW-3	PW-80A	-	3700 (a)	15.6	0.5 U	1.57	0.5 U	0.23 J	0.54	0.5 U	0.5 U	0.5 U	0.5 U	1.09	3.84	2.39	2.95	14.7
Acid Sump	FW-3	PW-81A	-	3700 (a)	1 U														4.43
Acid Sump	FW-3	PW-82A	-	3700 (a)	1.8	0.5 U	0.13 J	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Acid Sump	FW-3	PW-98A	-	3700 (a)		170	253	3.42	503	268	384	7.63	39.4	37.1	12	18.8	52.2	111	311
Acid Sump	FW-3	FW-6	-	3700 (a)				4.82	6.13	3.1	4.18	0.73	3.78	2.55	0.31 J	0.35 J	0.21 J	76.4	0.37 J
Material Recycle	FW-2	PW-87A	-	3700 (a)	1.5	0.59	0.62	0.5 U	0.23 J	0.5 U	0.5 U	0.5 U	0.5 U	0.31 J	0.5 U	0.17 J	0.16 J	0.5 U	0.15 J
Material Recycle	FW-2	PW-88A	-	3700 (a)	1 U	0.5 U	0.2 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Amm Sulfate Stg	FW-5	PW-20A	-	3700 (a)	1 U														0.5 U
Amm Sulfate Stg	FW-5	PW-84A	-	3700 (a)	6.5	1.35	3.65	0.5 U	2.49	2.18	1.98	1.46	3.12	2.9	2.12	2.02	2.2	2.25	1.76
Amm Sulfate Stg	FW-5	PW-89A	-	3700 (a)	5.7	0.58	0.39 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.31 J	0.33 J	0.62	0.5	0.27 J	0.5 U
Amm Sulfate Stg	FW-5	PW-92A	-	3700 (a)	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Former CCA	FW-1	PW-31A	-	3700 (a)	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U
Former CCA	FW-1	PW-70AR	-	3700 (a)	1 U				0.16 J	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U					0.5 U
Former CCA	FW-1	PW-72A	-	3700 (a)	3.1											0.5 U	0.5 U	0.5 U	0.5 U
Former CCA	FW-1	PW-101A	-	3700 (a)				1.56	671	591	513	2.99	0.95	0.87	0.75	0.42 J	0.51	1.85	0.51
Dump Master	FW-4	PW-46A	-	3700 (a)	9.5	4.31	4.27	0.5 U	2.86	2.64	1.34	5.27	1.16	4.81	0.68	1.66	0.55	0.36 J	0.5 U
Dump Master	FW-4	PW-74B	-	3700 (a)	3.2	0.5 U	2.86	0.5 U	0.83	1.15	0.49 J	3.47	0.5 U	2.84	1.31	0.88	2.18	1.18	1.14
Dump Master	FW-4	PW-75A	-	3700 (a)	54.6	8.62	8.13	0.5 U	9.68	2.33	6.47	3.21	1.85	1.24	1.87	1.17	2.98	2.53	3.48
Dump Master	FW-4	PW-91A	-	3700 (a)	63.2	4.31	1.3	0.5 U	1.52	0.89	0.84	3.05	0.69	2.84	3.8	2.44	2.44	4.73	5.86
Perimeter Monitoring Wells																			
Acid Sump	FW-3	PW-15AR	-	3700 (a)	5 U														0.76
Acid Sump	FW-3	PW-76A	-	3700 (a)	2.3	0.34 J	2.04	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.4 J	0.33 J	0.5 U	0.5 U	0.5 U
Acid Sump	FW-3	PW-77A	-	3700 (a)	189	212	227	0.5 U	186	143	142	156	134	126	83	83.8	46.4	70.2	55.5
Acid Sump	FW-3	PW-78A	-	3700 (a)	118	141	114	0.5 U	87.2	73.4	25.8	22.9	18.1	17.2	62.2	62	59.3	65.1	51.2
Acid Sump	FW-3	PW-79A	-	3700 (a)	12.3	1.88	5.52	0.5 U	1.64	1.26	1.16	0.55	0.67	0.61	2.56	1.52	0.5 U	0.59	1.23

Notes:

(a) Risked based value based on industrial worker tap water ingestion pathway
U = not detected above reporting limit shown
D= Dilution
J = estimated value
E = Estimated value above the calibration range
Blank Cells indicate no analysis performed
= detected value exceeds ROD Standard
Source of Data through 2015 (GSI 2016d)
Source of Data through 2016 (GSI 2017a)

The fifth five year review covers 2013 through 2017.
Initial GW samples from for PW-98A and PW-99A were collected in July 2009.
Initial GW samples from PW-100A and PW-101A were collected in August 2010.
Initial GW samples from E-11 were collected in May 2010.
Initial GW samples from FW-6 were collected in April 2010.
The Fall 2014 sampling event was conducted in February 2015.
No samples were collected during Fall 2015 due to low water levels

Tabke A-7
Fabrication Area Monitoring Well Concentrations for Nitrate

Contaminant Source	Extraction Well	Well ID	ROD Standard (MCL)	ROD Standard (1E-06 RBC)	Baseline Fall 2000	Spring 2009	Fall 2009	Spring 2010	Fall 2010	Spring 2011	Fall 2011	Spring 2012	Fall 2012	Spring 2013	Fall 2013	Spring 2014	Fall 2014	Spring 2015	Spring 2016
Hot Spot Monitoring Wells																			
Acid Sump	FW-3	PW-11	10	-	**10.6**	7	6	5.5	5.2	4.8	5 U	7	6.25	5.69	6.78	4.69	5.43	1.51	3.59
Acid Sump	FW-3	PW-12	10	-	0.1 U	5 U	5 U	5 U	5 U	5 U	5 U	0.42	0.068 J	5 U	0.00767 U	0.1 U	0.0062 J	0.1 U	0.33 U
Acid Sump	FW-3	PW-13	10	-	**97.5**	**160**	**33**	**29**	**27**	**22**	**22**	1.44	1.02	0.99	**39.3**	**60.5**	**45.8**	**57.7**	0.85
Acid Sump	FW-3	PW-99A	10	-		2.31	5 U	5 U	5 U	5 U	5 U	0.97	0.96	0.94	5.9	**13.2**	6.66	0.34	2.57
Acid Sump	FW-3	E-11	10	-				5 U	5 U	5 U	5 U	0.24	0.21	2.6	**16.7**	0.1 U	0.0306 J	0.0041 J	0.085 J
Material Recycle	FW-2	PW-42A	10	-	0.1 U														0.09 U
Material Recycle	FW-2	PW-85A	10	-	1.02														3.06
Material Recycle	FW-2	PW-86A	10	-	0.1 U														0.85
Amm-Sulfate Stg	FW-5	PW-01A	10	-	**20** U														1.03 U
Amm-Sulfate Stg	FW-5	PW-03A	10	-	**13.1**														**19.9**
Amm-Sulfate Stg	FW-5	PW-83A	10	-	3.41														0.632
Former CCA	FW-1	PW-45A	10	-	0.1 U														0.17 U
Former CCA	FW-1	PW-68A	10	-	2.33														1.45
Former CCA	FW-1	PW-69A	10	-	0.1 U							0.017 U	0.1 U	0.1 U	0.00767 U		0.0068 J	0.1 U	0.09 U
Former CCA	FW-1	PW-71A	10	-	0.12														0.12 U
Former CCA	FW-1	PW-100A	10	-								0.017 U	0.1 U	0.1 U	0.00767 U		0.0331 J	0.0291 J	0.1 U
Former CCA	FW-7	MW-01A	10	-	0.1 U														0.26
Former CCA	FW-7	MW-02A	10	-	0.1 U														0.09 J
Former CCA	FW-7	MW-03A	10	-	0.1 U														0.1 U
Former CCA	FW-7	MW-04A	10	-	1.22														0.1 U
Former CCA	FW-7	PW-93A	10	-								0.017 U	0.1 U	0.1 U	0.00767 U		0.0137 J	0.0038 J	0.1 U
Former CCA	FW-7	PW-94A	10	-								0.017 U	0.1 U	0.1 U	0.00767 U		0.0042 J	0.1 U	0.1 U
Former CCA	FW-7	PW-95A	10	-								0.33	0.18	0.1 U	0.00767 U		0.487	0.588	0.29 U
Dump Master	FW-4	PW-30A	10	-	0.66														0.83
Dump Master	FW-4	PW-73B	10	-	0.1 U														0.11 U
Non Hot Spot Monitoring Wells																			
Acid Sump	FW-3	PW-10	10	-	0.1 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0.489	0.205	0.126	0.926	0.36 U
Acid Sump	FW-3	PW-14	10	-	0.1 U														2.78
Acid Sump	FW-3	PW-16A	10	-	0.1 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	1.67	1.2	1.87	1.5	1.34
Acid Sump	FW-3	PW-19A	10	-	1.63	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	3.1	2.4	2.71	2.96	2.82
Acid Sump	FW-3	PW-80A	10	-	4.22	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0.584	1.11	0.252	0.735	0.97
Acid Sump	FW-3	PW-81A	10	-	0.1 U														0.0856 J
Acid Sump	FW-3	PW-82A	10	-	9.25	9	7	6	5	6	5	6.81	6.23	5.99	4.34	2.61	2.59	3.83	3.72
Acid Sump	FW-3	PW-98A	10	-		8.76 (2)	5 U	7.5	6.9	2.4	2.4	2.65	**13.3**	**11.9**	0.00767 U	1.16	5.41	**21.7**	**24.3** J
Acid Sump	FW-3	FW-6	10	-				5 U	5 U	5 U	5 U	1.81	5 U	5 U	1.83	1.48	1.59	0.895 J	1.31
Material Recycle	FW-2	PW-87A	10	-	0.1 U														0.1 U
Material Recycle	FW-2	PW-88A	10	-	0.1 U														0.1 U
Amm Sulfate Stg	FW-5	PW-20A	10	-	**10.1**														4.6
Amm Sulfate Stg	FW-5	PW-84A	10	-	0.65														1.35
Amm Sulfate Stg	FW-5	PW-89A	10	-	**177**	**290**	**45**	**38**	**28**	**23**	**22**	**18**	**18**	**76.5**	**40.8**	**116**	**74.3**	**77**	**140**
Amm Sulfate Stg	FW-5	PW-92A	10	-	1.43														0.1 U
Former CCA	FW-1	PW-31A	10	-	4.66														**13.2**
Former CCA	FW-1	PW-70AR	10	-	0.1 U														0.634
Former CCA	FW-1	PW-72A	10	-	0.1 U														0.57
Former CCA	FW-1	PW-101A	10	-								0.017 U	0.1 U	0.1 U	0.142		0.0116 J	0.1 U	0.1 U
Dump Master	FW-4	PW-46A	10	-	0.1 U														0.26 U
Dump Master	FW-4	PW-74B	10	-	0.23														0.13 U
Dump Master	FW-4	PW-75A	10	-	0.1 U														0.65
Dump Master	FW-4	PW-91A	10	-	0.1 U														0.1 U
Perimeter Monitoring Wells																			
Acid Sump	FW-3	PW-15AR	10	-	0.1 U														0.66
Acid Sump	FW-3	PW-76A	10	-	0.62	5 U		5 U	5 U	5 U	5 U	5 U	5 U	5 U	0.516	0.408	0.547	0.265	0.41 U
Acid Sump	FW-3	PW-77A	10	-	0.1 U	5 U		5 U	5 U	5 U	5 U	0.31	5 U	5 U	0.234	0.402	0.274	0.312	0.27 U
Acid Sump	FW-3	PW-78A	10	-		5 U		5 U	5 U	5 U	5 U	0.11	5 U	5 U	0.315	0.411	0.315	0.507	0.46 U
Acid Sump	FW-3	PW-79A	10	-	7.54	5 U		5 U	5 U	5 U	5 U	5 U	5 U	5 U	0.55	0.312	0.0286 J	0.0222 J	0.16 U

Notes:
U = not detected above reporting limit shown
D= Dilution
J = estimated value
Blank Cells indicate no analysis performed
= detected value exceeds ROD Standard.
Source of Data through 2015 (GSI 2016d)
Source of Data through 2016 (GSI 2017a)

The fifth five year review covers 2013 through 2017.
Initial GW samples from for PW-98A and PW-99A were collected in July 2009.
Initial GW samples from PW-100A and PW-101A were collected in August 2010.
Initial GW samples from E-11 were collected in May 2010.
Initial GW samples from FW-6 were collected in April 2010.
The Fall 2014 sampling event was conducted in February 2015.
No samples were collected during Fall 2015 due to low water levels

Table A-8
Fabrication Area Monitoring Well Concentrations for Ammonium

Contaminant Source	Extraction Well	Well ID	ROD Standard (MCL)	ROD Standard (1E-06 RBC)	Baseline Fall 2000	Spring 2009	Fall 2009	Spring 2010	Fall 2010	Spring 2011	Fall 2011	Spring 2012	Fall 2012	Spring 2013	Fall 2013	Spring 2014	Fall 2014	Spring 2015	Spring 2016
Hot Spot Monitoring Wells																			
Acid Sump	FW-3	PW-11	250	-	8														3.88
Acid Sump	FW-3	PW-12	250	-	2														0.26
Acid Sump	FW-3	PW-13	250	-	9														2.34
Acid Sump	FW-3	PW-99A	250	-															0.05 U
Acid Sump	FW-3	E-11	250	-															0.2
Material Recycle	FW-2	PW-42A	250	-	0.1 U														0.097
Material Recycle	FW-2	PW-85A	250	-	0.4													18.3	0.05 U
Material Recycle	FW-2	PW-86A	250	-	0.9														0.05 U
Amm-Sulfate Stg	FW-5	PW-01A	250	-	**4413**	150	111	100	81	69	75	56	139	129	119.8	**735**	229	224	141
Amm-Sulfate Stg	FW-5	PW-03A	250	-	**274**	60	56	53	35	35	29	19	71.1	63.6	80	86.4	70	69.9	53.6
Amm-Sulfate Stg	FW-5	PW-83A	250	-	42.6	13	33	26	23	18	15	10	18.5	25.3	19.5	11.5	14.1		17
Former CCA	FW-1	PW-45A	250	-	0.3														0.14
Former CCA	FW-1	PW-68A	250	-	0.4														0.05 U
Former CCA	FW-1	PW-69A	250	-	0.8														0.89
Former CCA	FW-1	PW-71A	250	-	0.4														0.54
Former CCA	FW-1	PW-100A	250	-															0.21
Former CCA	FW-7	MW-01A	250	-	0.1 U														0.05 U
Former CCA	FW-7	MW-02A	250	-	0.3 U														0.039 J
Former CCA	FW-7	MW-03A	250	-	0.1 U														0.063 J
Former CCA	FW-7	MW-04A	250	-	0.2														0.05 U
Former CCA	FW-7	PW-93A	250	-															0.54
Former CCA	FW-7	PW-94A	250	-															0.92
Former CCA	FW-7	PW-95A	250	-															0.05 U
Dump Master	FW-4	PW-30A	250	-	0.1 U														0.051
Dump Master	FW-4	PW-73B	250	-	0.1 U														0.05 U
Non Hot Spot Monitoring Wells																			
Acid Sump	FW-3	PW-10	250	-	1.8														0.05 U
Acid Sump	FW-3	PW-14	250	-	0.1 U														0.05 U
Acid Sump	FW-3	PW-16A	250	-	0.1 U														0.05 U
Acid Sump	FW-3	PW-19A	250	-	0.1 U														0.05 U
Acid Sump	FW-3	PW-80A	250	-	2.7														0.46
Acid Sump	FW-3	PW-81A	250	-	0.1 U														0.0952
Acid Sump	FW-3	PW-82A	250	-	82														20.3
Acid Sump	FW-3	PW-98A	250	-															0.033 J
Acid Sump	FW-3	FW-6	250	-															0.05 U
Material Recycle	FW-2	PW-87A	250	-	0.6														0.86
Material Recycle	FW-2	PW-88A	250	-	6.5														2.91
Amm Sulfate Stg	FW-5	PW-20A	250	-	0.1 U														0.05 U
Amm Sulfate Stg	FW-5	PW-84A	250	-	0.2	0.6 U	0.6 U	0.5 U	0.6 U	0.6 U	0.6 U	0.6 U	0.1 U	0.1 U	0.01788 U	0.04113 J	0.06 U	0.02725 J	0.074 U
Amm Sulfate Stg	FW-5	PW-89A	250	-	107	80	31.3	23	20	18	15	13	11	10.16	48	78.1	40	31.5	0.074
Amm Sulfate Stg	FW-5	PW-92A	250	-	8.8	8.8	6.3	5	5	5	5	6 U	5.1	4.44	3.96	5.01	4.24	4.49	3.45
Former CCA	FW-1	PW-31A	250	-	0.1 U														0.05 U
Former CCA	FW-1	PW-70AR	250	-	0.1 U														0.05 U
Former CCA	FW-1	PW-72A	250	-	0.1 U														0.05 U
Former CCA	FW-1	PW-101A	250	-															0.19
Dump Master	FW-4	PW-46A	250	-	0.4														0.05 U
Dump Master	FW-4	PW-74B	250	-	0.1 U														0.15
Dump Master	FW-4	PW-75A	250	-	0.6														0.024 J
Dump Master	FW-4	PW-91A	250	-	1.1														0.67
Perimeter Monitoring Wells																			
Acid Sump	FW-3	PW-15AR	250	-	0.1 U														0.024 J
Acid Sump	FW-3	PW-76A	250	-	0.1 U														0.05 U
Acid Sump	FW-3	PW-77A	250	-	0.5														0.05 U
Acid Sump	FW-3	PW-78A	250	-	0.1 U														0.05 U
Acid Sump	FW-3	PW-79A	250	-	0.3														0.05 U

Notes:
U = not detected above reporting limit shown
D= Dilution
J = estimated value
Blank Cells indicate no analysis performed
= detected value exceeds ROD Standard.

The fifth five year review covers 2013 through 2017.
The Fall 2014 sampling event was conducted in February 2015.
No samples were collected during Fall 2015 due to low water levels

Table A-9
Fabrication Area Monitoring Well Concentrations for Fluoride

Contaminant Source	Extraction Well	Well ID	ROD Standard (MCL)	ROD Standard (1E-06 RBC)	Baseline Fall 2000	Spring 2009	Fall 2009	Spring 2010	Fall 2010	Spring 2011	Fall 2011	Spring 2012	Fall 2012	Spring 2013	Fall 2013	Spring 2014	Fall 2014	Spring 2015	Spring 2016
Hot Spot Monitoring Wells																			
Acid Sump	FW-3	PW-11	2	-	2.44	2	2	2 U	2 U	2 U	2 U	1 U	1 U	1 U	1.73	1.43	2.99	2.51	2.4
Acid Sump	FW-3	PW-12	2	-	0.7	2	1 U	1 U	1 U	1 U	1 U	1 U	9.65	9.56	2.27	1.77	2.8	2.97	3.04
Acid Sump	FW-3	PW-13	2	-	43.2	69	31	27	24	16	21	19	17	14	28.7	27.6	25.9	31.2	17.7
Acid Sump	FW-3	PW-99A	2	-			10	9.8	7.3	9.4	3.4	15	13	12	9.69	9.86	12.8	12.8	12.9
Acid Sump	FW-3	E-11	2	-				10	9	9	8	7.8	3.1	2.9	3.07	2.96	5.25	5.09	5.94
Material Recycle	FW-2	PW-42A	2	-	0.16														0.13 J
Material Recycle	FW-2	PW-85A	2	-	1														0.65 J
Material Recycle	FW-2	PW-86A	2	-	0.1 U														1.4
Amm-Sulfate Stg	FW-5	PW-01A	2	-	20 U														0.78 U
Amm-Sulfate Stg	FW-5	PW-03A	2	-	1.44														1.2
Amm-Sulfate Stg	FW-5	PW-83A	2	-	0.16														0.622 J
Former CCA	FW-1	PW-45A	2	-	0.1 U														0.094 J
Former CCA	FW-1	PW-68A	2	-	0.15														0.19 J
Former CCA	FW-1	PW-69A	2	-	11								1.39		6.14				8.89
Former CCA	FW-1	PW-71A	2	-	1.1														1.8
Former CCA	FW-1	PW-100A	2	-									11.7	10.3					0.11 U
Former CCA	FW-7	MW-01A	2	-	0.12														0.12 J
Former CCA	FW-7	MW-02A	2	-	0.17														0.43 J
Former CCA	FW-7	MW-03A	2	-	0.16														0.18 J
Former CCA	FW-7	MW-04A	2	-	0.18														0.18 J
Former CCA	FW-7	PW-93A	2	-									9.85		1.97				3.99
Former CCA	FW-7	PW-94A	2	-									9.75						7.04
Former CCA	FW-7	PW-95A	2	-									7.33						9.84
Dump Master	FW-4	PW-30A	2	-	0.38														0.27 J
Dump Master	FW-4	PW-73B	2	-	0.15														0.32 J
Non Hot Spot Monitoring Wells																			
Acid Sump	FW-3	PW-10	2	-	50	24	25	20	18	15	14	9	12	11.3	26.2	20.1	25.8	42.1	26.7
Acid Sump	FW-3	PW-14	2	-	2.06														0.86 J
Acid Sump	FW-3	PW-16A	2	-	0.1 U	1 U		1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.0103 U	0.213 J	0.0661 J	0.0812 J	0.24 J
Acid Sump	FW-3	PW-19A	2	-	0.1	1 U									0.443	0.539 J	0.119 J	0.146 J	0.28 J
Acid Sump	FW-3	PW-80A	2	-	0.17	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.486	0.273 J	0.143 J	0.186 J	0.35 J
Acid Sump	FW-3	PW-81A	2	-	0.1 U														0.0653 J
Acid Sump	FW-3	PW-82A	2	-	0.42	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.648	0.51 J	0.429 J	0.678 J	0.982 J
Acid Sump	FW-3	PW-98A	2	-			19					11.1	10.2		9.11	9.87	8.84	13.7	16.8
Acid Sump	FW-3	FW-6	2	-				2	1.8	1.8	1.5	1.5	1.2	1.1	7.34	4.3	8.47	42.8	9.8
Material Recycle	FW-2	PW-87A	2	-	0.27														0.32 J
Material Recycle	FW-2	PW-88A	2	-	0.4														0.55 J
Amm Sulfate Stg	FW-5	PW-20A	2	-	0.27														0.29 J
Amm Sulfate Stg	FW-5	PW-84A	2	-	0.83														0.64 J
Amm Sulfate Stg	FW-5	PW-89A	2	-	17	27	10	8.2	7.5	7.8	6.4	5.5	5.5	9.87	9	9.9	13.5	14.5	13.6
Amm Sulfate Stg	FW-5	PW-92A	2	-	0.23														0.54 J
Former CCA	FW-1	PW-31A	2	-	0.13														0.046 J
Former CCA	FW-1	PW-70AR	2	-	0.1 U														0.0933 J
Former CCA	FW-1	PW-72A	2	-	5.62														2.64
Former CCA	FW-1	PW-101A	2	-									1.57	1.46					1.88
Dump Master	FW-4	PW-46A	2	-	0.29														0.19 J
Dump Master	FW-4	PW-74B	2	-	0.17														0.29 J
Dump Master	FW-4	PW-75A	2	-	0.8														1.12
Dump Master	FW-4	PW-91A	2	-	0.6														1.15
Perimeter Monitoring Wells																			
Acid Sump	FW-3	PW-15AR	2	-	0.1 U														0.32 J
Acid Sump	FW-3	PW-76A	2	-	0.35	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.524	0.374 J	0.286 J	0.357 J	0.47 J
Acid Sump	FW-3	PW-77A	2	-	0.64	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.686	0.464 J	0.287 J	0.311 J	0.45 J
Acid Sump	FW-3	PW-78A	2	-	0.19	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.494	0.288 J	0.273 J	0.33 J	0.45 U
Acid Sump	FW-3	PW-79A	2	-	0.96	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.0103 U	0.236 J	0.127 J	0.153 J	0.29 J

Notes:
U = not detected above reporting limit shown
D= Dilution
J = estimated value
Blank Cells indicate no analysis performed
= detected value exceeds ROD Standard.
Source of Data through 2015 (GSI 2016d)
Source of Data through 2016 (GSI 2017a)

The fifth five year review covers 2013 through 2017.
Initial GW samples from E-11 were collected in May 2010.
Initial GW samples from FW-6 were collected in April 2010.
The Fall 2014 sampling event was conducted in February 2015.
No samples were collected during Fall 2015 due to low water levels

Table A-10
Fabrication Area Sitewide Results for Wells Sampled in 2016
Volatile Organic Compounds

Monitoring Well	Containment Source	Chloromethane	Bromomethane	Vinyl Chloride	Chloroethane	Methylene Chloride	Acetone	Carbon Disulfide	1,1-Dichloroethylene	1,1-Dichloroethane	cis-1,2-Dichloroethylene	Chloroform	1,2-Dichloroethane	2-Butanone	1,1,1-Trichloroethane	Carbon Tetrachloride	Bromodichloromethane	1,2-Dichloropropane	cis-1,3-Dichloropropene	Trichloroethylene	Dibromochloromethane	1,1,2-Trichloroethane	Benzene	trans-1,3-Dichloropropene	Bromoform	4-Methyl-2-pentanone	2-Hexanone	Tetrachloroethylene	Toluene	1,1,2,2-Tetrachloroethane	Chlorobenzene	Ethyl Benzene	Styrene	Xylenes (Total)	Acrolein	Acrylonitrile	2-Chloroethylvinylether
Unit		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Cleanup Level[1]	*Sublevel*	--	--	2	--	--	--	--	7	3,700	70	70	5	--	200	5	--	5	--	5	60	3	5	--	--	--	--	5	1,000	0.175	100	--	100	10,000	--	--	--
FW-3	Acid Sump	0.5 U	0.5 U	3.6	27.8	0.5 U	0.5 U	0.5 U	130	123	4.41	0.68	0.5 U	5 U	181	0.5 U	0.5 U	0.5 U	0.5 U	27.6	0.35 J	0.28 J	0.5 U	0.5 U	12.3	0.5 U	5 U	1.61	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	0.5 U	0.5 U
PW-32A	Acid Sump	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 J	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.25 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	0.5 U	0.5 U
TMW-1	Acid Sump	25 U	25 U	90.8	11,500	25 U	135	25 U	114	2,000	25 U	25 U	25 U	250 U	97.1	25 U	25 U	25 U	25 U	9.79 J	25 U	25 U	25 U	25 U	25 U	25 U	250 U	25 U	8.94 J	25 U	25 U	25 U	25 U	75 U	25 U	25 U	25 U
TMW-3	Acid Sump	500 U	500 U	1,150	10,900	500 U	500 U	500 U	14,400	28,000	500 U	500 U	500 U	5,000 U	434,000	500 U	500 U	500 U	500 U	932	500 U	500 U	500 U	500 U	500 U	500 U	5,000 U	500 U	500 U	500 U	500 U	500 U	500 U	1,500 U	500 U	500 U	500 U
TMW-4	Acid Sump	500 U	500 U	500 U	1,340	500 U	1,550	500 U	64,200	74,600	500 U	327 J	500 U	5,000 U	442,000	500 U	500 U	500 U	500 U	2,160	500 U	587	500 U	500 U	500 U	500 U	5,000 U	500 U	500 U	500 U	500 U	500 U	500 U	1,500 U	500 U	500 U	500 U
TMW-5	Acid Sump	25 U	25 U	313	15,000	25 U	183	25 U	170	845	25 U	25 U	25 U	250 U	177	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	250 U	25 U	25 U	25 U	25 U	25 U	25 U	75 U	25 U	25 U	25 U
FW-5	Amm-Sulfate Stg	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	6.2	0.5 U	0.25 J	0.66	4.63	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.78	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.25 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	0.5 U	0.5 U
FW-4	Dump Master	0.5 U	0.5 U	0.39 J	0.87	0.5 U	0.5 U	0.5 U	20.2	8.85	1.31	0.5 U	0.5 U	5 U	304	0.5 U	0.5 U	0.5 U	0.5 U	0.92	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.26 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	0.5 U	0.5 U
PW-73A	Dump Master	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	0.5 U	0.5 U
PW-74A	Dump Master	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	0.5 U	0.5 U
FW-1	Former CCA	0.5 U	0.5 U	11	494	0.97	0.5 U	0.5 U	81.4	440	5.43	0.5 U	0.5 U	5 U	298	0.5 U	0.5 U	0.5 U	0.5 U	1.83	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	1.14	0.55	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	0.5 U	0.5 U
FW-7	Former CCA	0.5 U	0.5 U	6	0.5 U	0.5 U	0.5 U	0.5 U	11.3	1.49	0.62	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	0.5 U	0.5 U
MW-05A	Former CCA	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	250 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	250 U	25 U	25 U	25 U	25 U	25 U	25 U	1.5 U	25 U	25 U	25 U
MW-06A	Former CCA	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	0.5 U	0.5 U
MW-07A	Former CCA	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	0.5 U	0.5 U
MW-08A	Former CCA	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	0.5 U	0.5 U
MW-10A	Former CCA	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	0.5 U	0.5 U
MW-11A	Former CCA	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	0.5 U	0.5 U
FW-2	Material Recycle	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 J	0.15 J	3.63	0.19 J	0.5 U	5 U	0.88	0.5 U	0.5 U	0.5 U	0.5 U	22.4	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.6	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	0.5 U	0.5 U
PZ-01	Material Recycle	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.33 J	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.24 J	0.5 U	0.5 U	0.5 U	15	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	0.5 U	0.5 U

U = not detected above reporting limit shown The fifth five year review covers 2013 through 2017.

J = estimated value

1. Cleanup levels are derived from multiple sources; see Table B-4 of the Quality Assurance Project Plan (Sitewide QAPP) for details.

= detected value exceeds ROD Standard.

Source of Data through 2016 (GSI 2017a)

Table B-1
Extraction Area - Feed Makeup Area Groundwater Data 2009 to 2016

Hot Spot (HS) Non Hot Spot (NHS) Perimeter (P), or Recovery	Station	Parameter	Units	ROD Standard	Baseline July 2000	Spring 2009	Fall 2009	Spring 2010	Fall 2010	Spring 2011	Fall 2011	Spring 2012	Fall 2012	Spring 2013	Fall 2013	Spring 2014	Fall 2014	Spring 2015	Spring 2016
P	PW-21A	AMMONIUM [1]	MG/L	250		31	93	33	28	31	18	30.9	69.2	20	45.7	14.6	70.7		11
P	PW-22A	AMMONIUM [1]	MG/L	250	252	278	310	255	234	265	236	73.2	127	134	77.4	68.6	160	157	116
P	PW-23A	AMMONIUM [1]	MG/L	250	81.5	43	79	42	36	35	29	64.8	51.6	39.2	43.6	39.4	38.6	37.9	33.3
P	PW-24A	AMMONIUM [1]	MG/L	250	265	190	68	180	156	165	148	81.2	40.7	61.9	77.4	122	60.5	96.1	150
NHS	PW-27A	AMMONIUM [1]	MG/L	250		25	6	22	18	20	18	11.9		15.7	20.2	26.6	7.58	9.11	18
HS	PW-28A	AMMONIUM [1]	MG/L	250	450	205	290	190	157	167	145	324	352	259	173	170	262	234	116
HS	PW-50A	AMMONIUM [1]	MG/L	250	161	41	35	0.33	0.18	0.33	0.14	32.1	11.1	19.9	12.4	26.3	3.77	19	35.5
HS	PW-51A	AMMONIUM [1]	MG/L	250	195	60		55	44	48	28	73.2	95.2	69.5	107	106	88.4	101	126
HS	PW-52A	AMMONIUM [1]	MG/L	250	367	193		185	175	131	175	101		92.6	184	140	128	122	116
Recovery	EW-1	AMMONIUM [1]	MG/L	250	316	31	79	34	20	19	16	41.7	57	39.7	60.3	51.8	51.4	52.6	50
Recovery	EW-2	AMMONIUM [1]	MG/L	250	410	64	59	60	40	53	25	42.7	75.2	49			66.7	58.7	55.9
Recovery	EW-3	AMMONIUM [1]	MG/L	250	87.6	25	28	24	24	23	22	29.6	42.1	30.1	36.3	28.6	31	44.7	26.7
P	PW-21A	ARSENIC	MG/L	0.05		0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.012 J	0.025 U	0.025 U	0.010 U	0.00021 J	0.01 U		0.0002 J
P	PW-22A	ARSENIC	MG/L	0.05	0.0105	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.006 U	0.011 J	0.013 J	0.010 U	0.00068	0.00552 J	0.00457	0.00483
P	PW-23A	ARSENIC	MG/L	0.05	0.124	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.050	0.014 J	0.010 J	0.010 U	0.00613	0.0152	0.0327	0.00854
P	PW-24A	ARSENIC	MG/L	0.05		0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.006 U	0.025 U	0.007 J	0.010 U	0.00059	0.01 U	0.00082	0.00067
NHS	PW-27A	ARSENIC	MG/L	0.05		0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.006 U	0.012 J	0.012 J	0.010 U	0.00044	0.01 U	0.00038 J	0.00046 J
HS	PW-28A	ARSENIC	MG/L	0.05	0.239	0.14	0.14	0.12	0.11	0.09	0.09	0.331	0.109 J	0.110	0.011 J	0.05 U	0.05 U	0.05 U	0.05 U
HS	PW-50A	ARSENIC	MG/L	0.05	0.107	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.006 U	0.018 J	0.018 J	0.010 U	0.00113 J	0.00075 J	0.001 J	0.05 U
HS	PW-51A	ARSENIC	MG/L	0.05	0.044	0.02 U		0.02 U	0.02 U	0.02 U	0.02 U	0.006 U	0.017 J	0.013 J	0.010 U	0.00062 J	0.05 U	0.00122	0.00038 J
HS	PW-52A	ARSENIC	MG/L	0.05	0.099	0.02 U		0.02 U	0.02 U	0.02 U	0.02 U	0.011 J	0.029	0.029	0.010 U	0.05 U	0.05 U	0.0175 J	0.05 U
Recovery	EW-1	ARSENIC	MG/L	0.05	0.202	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.006 U	0.027	0.036	0.010 U	0.05 U	0.05 U	0.05 U	0.05 U
Recovery	EW-2	ARSENIC	MG/L	0.05	0.203	0.05	0.05	0.05	0.05	0.05	0.04	0.019 J	0.033	0.032			0.05 U	0.05 U	0.00454 J
Recovery	EW-3	ARSENIC	MG/L	0.05	0.056	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.006 U	0.017 J	0.025	0.010 U	0.00085 J	0.01 U	0.0012 J	0.05 U
P	PW-21A	CADMIUM	MG/L	0.005		0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.0003 J	0.0050 U	0.0050 U	0.0005 U	0.0005 U	0.01 U		0.0005 U
P	PW-22A	CADMIUM	MG/L	0.005	0.00025 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.0002 U	0.0003 J	0.0003 J	0.0005 U	0.0005 U	0.01 U	0.0005 U	0.0005 U
P	PW-23A	CADMIUM	MG/L	0.005	0.00025 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.0003 J	0.0050 U	0.0050 U	0.0005 U	0.0005 U	0.01 U	0.0005 U	0.0005 U
P	PW-24A	CADMIUM	MG/L	0.005		0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.0002 U	0.0050 U	0.0050 U	0.0006 J	0.0005 U	0.01 U	0.0005 U	0.0005 U
NHS	PW-27A	CADMIUM	MG/L	0.005		0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.0004 J	0.0005 J	0.0050 U	0.0005 U	0.00017 J	0.01 U	0.001 U	0.00013 J
HS	PW-28A	CADMIUM	MG/L	0.005	0.0361	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.0182 J	0.0255	0.0217	0.0072	0.078 U	0.196	0.0655	0.05 U
HS	PW-50A	CADMIUM	MG/L	0.005	0.025	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.0013 J	0.0020 J	0.0015 J	0.0005 U	0.00136 J	0.00174 J	0.0114 J	0.05 U
HS	PW-51A	CADMIUM	MG/L	0.005	0.0127	0.01 U		0.01 U	0.01 U	0.01 U	0.01 U	0.0019 J	0.0023 J	0.0012 J	0.0005 U	0.005 U	0.01 U	0.00013 J	0.00073
HS	PW-52A	CADMIUM	MG/L	0.005	0.0171	0.01 U		0.01 U	0.01 U	0.01 U	0.01 U	0.0034 J	0.0049 J	0.0035 J	0.0006 J	0.021	0.0469	3.07	0.05 U
Recovery	EW-1	CADMIUM	MG/L	0.005	0.0229	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.0058	0.0072	0.0062	0.0033 J	0.00924	0.0109	0.0146	0.05 U
Recovery	EW-2	CADMIUM	MG/L	0.005	0.0465	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.0052	0.0072	0.0045 J			0.271	0.108	0.911
Recovery	EW-3	CADMIUM	MG/L	0.005	0.026	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.0016 J	0.0015 J	0.0011 J	0.0013 J	0.00513	0.00686 J	0.0266	0.05 U

Table B-1
Extraction Area - Feed Makeup Area Groundwater Data 2009 to 2016

Hot Spot (HS) Non Hot Spot (NHS) Perimeter (P), or Recovery	Station	Parameter	Units	ROD Standard	Baseline July 2000	Spring 2009	Fall 2009	Spring 2010	Fall 2010	Spring 2011	Fall 2011	Spring 2012	Fall 2012	Spring 2013	Fall 2013	Spring 2014	Fall 2014	Spring 2015	Spring 2016
P	PW-21A	CHLORIDE	MG/L	none		10 U	10 U	10 U	10 U	10 U	10 U	83.2	8.55	5.04	4.7	3.71	7.14		3.02
P	PW-22A	CHLORIDE	MG/L	none	19034	588	640	572	561	546	489	138	195	276	225	112	295	448	227
P	PW-23A	CHLORIDE	MG/L	none	194	102	73	98	87	87	69	55.8	44	43.6	43.7	46.3	35.8	54.9	26.7
P	PW-24A	CHLORIDE	MG/L	none	162	96	82	95	78	83	78	64	25.4	67.9	86.6	126	53.5	93.1	346
NHS	PW-27A	CHLORIDE	MG/L	none		1580	1000	1475	1300	1520	1280	506	311	878	842	714	936	1070	641
HS	PW-28A	CHLORIDE	MG/L	none	9920	5600	8100	5400	3800	5200	3710	12200	12200	7680	7610	7910	5900	4680	3370
HS	PW-50A	CHLORIDE	MG/L	none	8362	1050	420	980	760	755	770	1220	1280	1090	1510	1230	1240	1620	661
HS	PW-51A	CHLORIDE	MG/L	none	5030	1380		1365	1265	1265	1165	1050	1180	894	890	627	512	1090	565
HS	PW-52A	CHLORIDE	MG/L	none	9310	3450		3500	2600	3410	2530	2400	2640	2900	4220	2300	2080	2810	2150
Recovery	EW-1	CHLORIDE	MG/L	none	8830	3250	3300	3180	2785	3260	2560	3030	2970	2910	3900	2530	2160	3540	2380
Recovery	EW-2	CHLORIDE	MG/L	none	19030	3950	3500	4150	3850	3890	3760	3090	3840	2860			2720	3730	2150
Recovery	EW-3	CHLORIDE	MG/L	none	7749	1480	1300	1375	1268	1275	1270	1220	929	852	1040	866	904	2190	1190
P	PW-21A	FLUORIDE	MG/L	2		1.2	2	1.1	1	1.1	1.1	6.66	1.21	0.46	1.28	0.448 J	1.78		0.46
P	PW-22A	FLUORIDE	MG/L	2	10 U	3.1	2	2.6	2.5	2.4	2.4	3.18	2.25	2.23	1.21	1.91	3.53	2.97	2.59
P	PW-23A	FLUORIDE	MG/L	2	13.6	17	21	14	12	12	11	19.5	22.3	15.3	16.8	17.1	24.4	26.1	22.8
P	PW-24A	FLUORIDE	MG/L	2	4.6	1 U	1 U	1 U	1 U	1 U	1 U	0.56	0.69	0.84	0.707	0.693 J	0.605 J	0.66 J	0.79
NHS	PW-27A	FLUORIDE	MG/L	2		1 U	1 U	1 U	1 U	1 U	1 U	0.1	0.11	0.023 J	0.0103 U	1 U	0.0437 J	0.0555 U	0.43
HS	PW-28A	FLUORIDE	MG/L	2	12.9	1 U	12	1 U	1 U	1 U	1 U	24.6	6.84	0.79	19.6	7.61	0.118 J	0.158 J	2.89
HS	PW-50A	FLUORIDE	MG/L	2	12.4	1.1	2	1 U	1 U	1 U	1 U	2.63	1.29	2.43	1.02	2.69	0.775 J	1.31	2.48
HS	PW-51A	FLUORIDE	MG/L	2	148	1.5		1.4	1.2	1.2	1.1	3.66	4.99	2.69	0.404	0.286 J	0.413 J	0.752 J	1.09
HS	PW-52A	FLUORIDE	MG/L	2	30.2	0.21		0.18	0.16	0.16	0.15	9.5	2.9	8.74	13.7	15.9	3.34	1.73	9
Recovery	EW-1	FLUORIDE	MG/L	2	40.8	1.2	24	1.1	1	1.2	1.2	12.9	11.7	13.5	8.16	10	2.99	3.28	9.76
Recovery	EW-2	FLUORIDE	MG/L	2	12.7	0.1 U	6	0.1 U	0.1 U	0.1 U	0.1 U	0.52	1.99	3.98			0.199 J	0.431 J	4.54
Recovery	EW-3	FLUORIDE	MG/L	2	31.3	5.1	7	4.2	3.8	3.8	3.3	13.4	9.85	5.41	8.43	5.89	5.35	6.66	3.99
P	PW-21A	IRON	MG/L	none															0.10 U
P	PW-22A	IRON	MG/L	none	20.2														6.82
P	PW-23A	IRON	MG/L	none	19.9														1.03
P	PW-24A	IRON	MG/L	none	1 U														0.05 J
NHS	PW-27A	IRON	MG/L	none															0.10 U
HS	PW-28A	IRON	MG/L	none	1450														561.00
HS	PW-50A	IRON	MG/L	none	599														27.60
HS	PW-51A	IRON	MG/L	none	55.1														0.36
HS	PW-52A	IRON	MG/L	none	471														43.00
Recovery	EW-1	IRON	MG/L	none	932														6.57
Recovery	EW-2	IRON	MG/L	none	1390														11.80
Recovery	EW-3	IRON	MG/L	none	172														16.00

Table B-1
Extraction Area - Feed Makeup Area Groundwater Data 2009 to 2016

Hot Spot (HS) Non Hot Spot (NHS) Perimeter (P), or Recovery	Station	Parameter	Units	ROD Standard	Baseline July 2000	Spring 2009	Fall 2009	Spring 2010	Fall 2010	Spring 2011	Fall 2011	Spring 2012	Fall 2012	Spring 2013	Fall 2013	Spring 2014	Fall 2014	Spring 2015	Spring 2016
P	PW-21A	MANGANESE	MG/L	none[2]		0.23	0.47	0.21	0.2	0.19	0.18	0.17	0.35	0.22	0.29	0.0839	0.468		0.0575
P	PW-22A	MANGANESE	MG/L	none[2]	3.53	2.4	3	2.36	2.11	2.31	2.01	1.50	1.86	1.72	2.10	1.8	1.64	2.46	1.79
P	PW-23A	MANGANESE	MG/L	none[2]	4.65	5.2	4.6	4.9	4.7	4.7	4.5	3.36	2.45	2.79	3.03	2.63	2.34	2.6	2.14
P	PW-24A	MANGANESE	MG/L	none[2]	9.11	0.98	0.81	0.78	0.67	0.61	0.58	2.17	0.40	0.92	1.60	3.68	1.56	2.51	4.87
NHS	PW-27A	MANGANESE	MG/L	none[2]		1.3	1.2	1.2	1.1	1.1	1	1.22	1.38	1.19	1.07	1.55	0.676	0.5	1.17
HS	PW-28A	MANGANESE	MG/L	none[2]	18.2	18	23	16	14	15	12	81.60	53.60	43.70	37.90	24.2	33.5	30.6	16.6
HS	PW-50A	MANGANESE	MG/L	none[2]	107	15.4	3.7	14.8	13.6	13.3	12.8	9.11	13.70	13.60	15.00	1.35	16.1	16.5	8.8
HS	PW-51A	MANGANESE	MG/L	none[2]	58.4	18.6		17.5	16.8	16.3	15.7	13.30	13.40	12.50	5.43	6.38	4.78	8	8.22
HS	PW-52A	MANGANESE	MG/L	none[2]	48	25.6		24.8	22.2	22.9	22.1	18.50	18.10	17.60	21.30	20.8	19.6	17.6	17.1
Recovery	EW-1	MANGANESE	MG/L	none[2]	36.7	72	63	68	60	59	55	56.30	54.50	57.80	53.00	51.4	48.5	49.4	52.8
Recovery	EW-2	MANGANESE	MG/L	none[2]	16.8	18	28	17	16	16	16	43.60	41.10	49.80			39.2	47.2	31.8
Recovery	EW-3	MANGANESE	MG/L	none[2]	156	18.2	16	17.8	16.5	16.1	16.2	35.80	30.20	31.40	28.50	27.3	23.9	41.9	19.9
P	PW-21A	NICKEL	MG/L	2		0.02	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U		0.020 U		0.006 J	0.00163	0.00764		0.0015
P	PW-22A	NICKEL	MG/L	2	0.2 U	0.02	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.004 U	0.020 U		0.003 U	0.00084	0.00971 J	0.00136	0.00111
P	PW-23A	NICKEL	MG/L	2	0.2 U	0.02	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.004 U	0.020 U		0.003 U	0.00084	0.00071 J	0.0007	0.00054
P	PW-24A	NICKEL	MG/L	2	0.2 U	0.02	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.004 U	0.020 U		0.006 J	0.00754	0.00246 J	0.0048	0.00397
NHS	PW-27A	NICKEL	MG/L	2		0.02	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.004 U	0.002 J		0.004 J	0.00917	0.00769 J	0.00576	0.00742
HS	PW-28A	NICKEL	MG/L	2	6.25	1.8	3.4	1.5	1.25	1.4	1.16		3.630		1.500	0.922	1.37	1.21	0.483
HS	PW-50A	NICKEL	MG/L	2	3	0.25	0.13	0.23	0.15	0.21	0.12		0.100		0.109	0.162	0.0648	0.254 J	0.205
HS	PW-51A	NICKEL	MG/L	2	2 U	0.3		0.25	0.22	0.19	0.22	0.300	0.327		0.029	0.075	0.0368	0.0824	0.108
HS	PW-52A	NICKEL	MG/L	2	3.54	1.6		1.3	1.1	1.1	1.1	0.913	0.835		1.170	1.14	1.04	0.907	0.886
Recovery	EW-1	NICKEL	MG/L	2	3.98	0.95	0.82	0.77	0.75	0.69	0.66		0.722		0.664	0.681	0.625	0.644	0.707
Recovery	EW-2	NICKEL	MG/L	2	5.65	1.7	1.8	1.6	1.5	1.5	1.4		1.060				0.988	0.919	0.735
Recovery	EW-3	NICKEL	MG/L	2	2.58	0.23	0.24	0.22	0.21	0.18	0.18		0.147		0.138	0.126	0.146	0.594	0.134
P	PW-21A	TDS	MG/L	none		255	250	310	290	320	270	352	313	264	440	167	305		259
P	PW-22A	TDS	MG/L	none	898	955	840	1050	1020	1030	980	280	263	747	412	320	482	805	540
P	PW-23A	TDS	MG/L	none	1000	684	550	630	525	622	489	312	305	337	369	281	277	298	261
P	PW-24A	TDS	MG/L	none	1590	420	270	430	425	418	420	576	174	272	469	1030	424	812	1200
NHS	PW-27A	TDS	MG/L	none		2200	2100	1800	1450	1780	1380	2420	2450	2940	2730	2790	2880	2550	2430
HS	PW-28A	TDS	MG/L	none	16300	13800	14000	12600	11800	12300	10700	16300	11700	11000	9660	10200	9280	7590	5880
HS	PW-50A	TDS	MG/L	none	12900	2010	760	1920	1870	2010	1920	1920	2520	2620	3010	2770	2920	3100	1580
HS	PW-51A	TDS	MG/L	none	8230	2840		2950	2846	2715	2670	2430	2620	2500	2700	2460	1850	2660	2300
HS	PW-52A	TDS	MG/L	none	11800	4650		4450	3950	4280	3740	3620	4230	5500	4500	5470	4100	3970	4580
Recovery	EW-1	TDS	MG/L	none	12700	5580	4700	5470	5060	5530	5120	5580	4490	5560	5230	5900	4630	5020	5400
Recovery	EW-2	TDS	MG/L	none	15700	6810	5100	6950	5440	5820	5550	4430	4250	5230			4350	4460	4350
Recovery	EW-3	TDS	MG/L	none	11700	2860	2300	2980	2750	2860	2640	3500	3110	3420	3170	3260	2920	4190	3350

Table B-1
Extraction Area - Feed Makeup Area Groundwater Data 2009 to 2016

Hot Spot (HS) Non Hot Spot (NHS) Perimeter (P), or Recovery	Station	Parameter	Units	ROD Standard	Baseline July 2000	Spring 2009	Fall 2009	Spring 2010	Fall 2010	Spring 2011	Fall 2011	Spring 2012	Fall 2012	Spring 2013	Fall 2013	Spring 2014	Fall 2014	Spring 2015	Spring 2016
P	PW-21A	RADIUM 226	pCi/L	5 [2]		3.2	40 U	1.5	1.4	0.21 J	0.18 J	1.5	1.9	0.04 U	0.46	0.43	1.2		0.67
P	PW-22A	RADIUM 226	pCi/L	5 [2]	0.2	3.3	40 U	0.83	0.75	0.12 J	0.11 J	0.59	1.2	0.2	-0.06	0.18	0.39	0.3	0.19
P	PW-23A	RADIUM 226	pCi/L	5 [3]	13	1.4	40 U	0.12 J	0.1 J	0.01 J	0.01 J	1	0.58	0.04 U	0.1	-0.001	0.31	0.5	0.02
P	PW-24A	RADIUM 226	pCi/L	5 [3]		2.4	40 U	0.1 J	0.2 J	0.12 J	0.06 J	0.33	0.46	0.06 U	0.04	0.11	0.04	0.2	0.06
NHS	PW-27A	RADIUM 226	pCi/L	5 [3]		2.4	40 U	0.15 J	0.12 J	0.02 J	0.01 J	0.62	1.5	0.2	0.09	0.03	0.62	0.3	0.08
HS	PW-28A	RADIUM 226	pCi/L	5 [3]	69	25	40 U	65	32	1.1 J	1.13 J	100	130	47.5	17	21	25	35.3	8.4
HS	PW-50A	RADIUM 226	pCi/L	5 [3]		6.5	40 U	0.75	0.67	0.04 J	0.03 J	1.7	6.8	1.8	1.2	1.7	0.67	2.1	1.3
HS	PW-51A	RADIUM 226	pCi/L	5 [3]	0.5	2.1		0.39 J	0.31 J	0.21 J	0.18 J	0.51	1.8	0.1	0	0.06	0.34	0.4	0.22
HS	PW-52A	RADIUM 226	pCi/L	5 [3]	12	3.2		3.1	2.1	0.06 J	0.05 J	2.3	13	1.6	0.42	1.8	1.7	3.3	0.38
Recovery	EW-1	RADIUM 226	pCi/L	5 [3]	51	3.5	40 U	1.6	1.5	0.01 J	0.01 J	1.7	5.8	1.1	0.72	0.9	1.1	1.8	0.58
Recovery	EW-2	RADIUM 226	pCi/L	5 [3]	68	35	40 U	18	12	0.11 J	0.12 J	14	47	8.2			14	10.6	6.3
Recovery	EW-3	RADIUM 226	pCi/L	5 [3]	6.2	2.5	40 U	3.3	2.3	0.22 J	0.23 J	0.22	0.85	0.2	0.14	0.16	0.48	2.2	0.18
P	PW-21A	RADIUM 228	pCi/L	5 [3]		2.1	40 U	0.92 J	0.84 J	0.11 J	0.07 J	4.3	6.8	0.2 U	2.4	-0.3	1.2		1.4
P	PW-22A	RADIUM 228	pCi/L	5 [3]	1.4	2.4	40 U	0 J	0.1 J	0.11 J	0.11 J	1.4	1.8	0.4 U	1.9	-0.2	0.45	0.7 U	0.39
P	PW-23A	RADIUM 228	pCi/L	5 [3]	2.6	1.6	40 U	0 J	0.05 J	0.01 J	0.01 J	2.5	2.3	0.2 U	1.4	-1	-0.3	1.4	0.45
P	PW-24A	RADIUM 228	pCi/L	5 [3]		3.1	40 U	0.29 J	0.2 J	0.11 J	0.05 J	1.3	0.8	0.2 U	1.1	-0.07	1.4	0.7 U	-0.94
NHS	PW-27A	RADIUM 228	pCi/L	5 [3]		2.1	40 U	1.5	1.3	0.05 J	0.04 J	3.1	0.2	0.6 U	3.3	-0.1	1.4	1.5	1.4
HS	PW-28A	RADIUM 228	pCi/L	5 [3]	140	12	54	11	5	1.12 J	1.4 J	17	9.3	56.5	32	34	54	42.6	13
HS	PW-50A	RADIUM 228	pCi/L	5 [3]		5.3	40 U	1.9	1.7	0.02 J	0.02 J	4.1	3.9	4.4	5.3	6.8	4.7	6	3.3
HS	PW-51A	RADIUM 228	pCi/L	5 [3]		2.6		0.59 J	0.49 J	0.11 J	0.1 J	1.2	1.3	0.3 U	0.05	0.55	0.77	1.5	0.42
HS	PW-52A	RADIUM 228	pCi/L	5 [3]	9.3	1.8		2.7	2.7	0.11 J	0.08 J	2.9	2.3	2.6	3	2.3	0.71	4.2	-0.02
Recovery	EW-1	RADIUM 228	pCi/L	5 [3]	14	5.9	40 U	3.1	3.2	0.01 J	0.01 J	2.4	4.9	1.8	2.2	3.5	4.5	4	1.8
Recovery	EW-2	RADIUM 228	pCi/L	5 [3]	150	21	55 U	14	16	0.56 J	0.47 J	11	8.8	24.4			31	17	16
Recovery	EW-3	RADIUM 228	pCi/L	5 [3]	0	3.6	40 U	4.1	3.3	0.18 J	0.17 J	1.6	1.2	0	0.4 J	1.5	1.6	3.2	1

= detected value exceeds ROD Standard.
= laboratory reporting limit greater than ROD Standard

NOTES
[1] From 2002 to 2008, CH2M HILL reported this constituent as Ammonia/Ammonium.
[2] Standard modified in 2010 to reflect Oregon Environmental Quality Commission's removal of risk-based Mn freshwater criteria.
[3] Radium exceeds if total of R226+R228 exceeds 5 pCi/L.
ROD standards are from Table 10-1 of the ROD.
A risk-based level (non-cancer hazard index = 1 for industrial exposure) was calculated for nickel.
U = Constituent not detected above method detection limit.
J = Estimated concentration below the analysis reporting limit.
E = Estimated value above calibration range.
pCi/L = picocuries per liter.
TDS = total dissolved solids.
mg/L = milligrams per liter
Source of Data through 2015 (GSI 2016e)
Source of Data through 2016 (GSI 20167a)

Table B-2
Extraction Area - Feed Makeup Area Results for Wells Sampled Only in Spring 2016
Total Metals

Monitoring Well	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Copper	Cyanide	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Selenium	Silver	Sodium	Thallium	Thorium	Tin	Uranium	Zinc
Unit	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	mg/L	µg/L
Cleanup Level[1]	--	6	10	2,000	1	5	--	100	1,000	200	--	--	--	50	2	--	50	--	--	2	--	--	0.03	--
EW-4	194	0.14 J	2.32	5.34	0.034 J	0.1 J	14,800	0.5 J	2 U	5 U	165	0.066 U	5,920	175	0.1 U	1.14	1.99	0.5 U	49,100	0.2 U	0.005 U	25 U	0.0005 U	4.31 U
EW-5	3,050	0.094 J	0.54	19.4	1	0.33 J	52,400	0.24 J	2.15	5 U	10 J	0.5 U	19,000	2,430	0.1 U	8.43	1.48	0.5 U	65,100	0.2 U	0.005 U	25 U	0.0005 U	5.06 U
EW-6	57.4	0.5 U	15.3	42.9	0.5 U	0.069 J	99,500	0.15 J	2 U	5 U	8,030	0.068 U	48,700	9,700	0.1 U	2.73	1.15	0.5 U	59,700	0.2 U	0.005 U	10.6 J	0.0005 U	44.7
PW-25A	299	0.19 U	0.71	12.1	0.5 U	0.099 J	51,100	0.46 J	0.8 J	5 U	452	0.55	34,200	67.6	0.1 U	1.51	1.26	0.5 U	19,800	0.2 U	0.005 U	11 J	0.0005 U	10 U
PW-26A	287	0.1 J	0.94	10	0.19 J	0.5 U	32,000	0.48 J	4 U	7.73	48.3 J	0.066 U	12,700	28.1	0.16	1.8	2.13	0.5 U	54,000	0.2 U	0.005 U	25 U	0.0005 U	3.81 U
PW-29A	436	0.46 U	2.3	3.82	0.5 U	0.03 J	10,300	0.83 J	2.75	5 U	565	1.39	3,860	7.55	0.1 U	0.8	0.1 J	0.035 J	6,530	0.2 U	0.005 U	25 U	0.0005 U	5.8 U
PW-47A	49	0.058 J	12.1	36.6	0.13 J	0.045 J	76,300	0.27 J	1.6 J	1.74 J	8,150	0.48 J	30,300	5,370	0.1 U	4.54	1.13	0.5 U	102,000	0.2 U	0.005 U	25 U	0.0003 J	5.08 U
PW-48A	509	0.48 J	11.8	5.68	0.5 U	0.2 J	9,870	2.37	15.2	1.63 J	556	1.09	2,320	15.2	0.054 J	4.43	0.75	0.11 J	89,700	0.2 U	0.005 U	25 U	0.0004 J	7.86 U
PW-49A	742	0.21 J	1.25	4.37	0.5 U	0.5 U	7,240	1.04	1.16 J	5 U	912	0.59	3,140	11.3	0.1 U	1.34	1.08	0.5 U	13,600	0.2 U	0.005 U	25 U	0.0005 U	5.77 U
PW-57A	12.3 U	0.037 J	7.48	18.2	0.04 J	0.5 U	51,900	1 U	2.12	4.39 J	2,800	0.5 U	21,500	5,550	0.1 U	1.81	1.85	0.5 U	70,300	0.2 U	0.005 U	25 U	0.0005 U	3.46 U
PW-96A	19 U	0.047 J	17.4	22.8	0.053 J	0.5 U	67,000	1 U	4 U	2.66 J	9,010	0.5 U	28,800	6,410	0.1 U	2.81	1.47	0.5 U	59,100	0.2 U	0.005 U	25 U	0.0001 J	3.51 U
PW-97A	7.96 U	0.5 U	11.1	32.4	0.5 U	0.5 U	113,000	1 U	4 U	5 U	4,870	0.5 U	60,300	10,000	0.1 U	2.9	1.25	0.5 U	56,200	0.2 U	0.005 U	12.4 J	0.0364	3.55 U
PW-06	10 U	0.033 U	0.22 J	1.09 J	0.5 U	0.5 U	17,000	1 U	2 U	5 U	8,370	0.5 U	8,850	95.6	0.1 U	0.41 U	0.18 J	0.5 U	10,800	0.2 U	0.005 U	25 U	0.0005 U	4.36 U

Notes:

1 Cleanup levels are derived from multiple sources; see Table B-4 of the Quality Assurance Project Plan (Sitewide QAPP) for details.

µg/L = microgram per liter.

= detected value exceeds cleanup level.

Source of Data from 2016 (GSI 2017a)

Table C-1
Extraction Area - South Extraction Area Volatile Organic Compound Groundwater Data 2009-2016

Hot Spot (HS) Non Hot Spot (NHS) Perimeter (P), or Recovery	Well	Parameter	Units	ROD Standard	Baseline July 2000	Spring 2009	Fall 2009	Spring 2010	Fall 2010	Spring 2011	Fall 2011	Spring 2012	Fall 2012	Spring 2013	Fall 2013	Spring 2014	Fall 2014	Spring 2015	Spring 2016
P	PW-25A	TCA	UG/L	200	4.1	0.63	0.42 J	0.5 U	0.5 U	0.5 U	0.5 U	0.34 J	0.5 U	0.5 U					0.18 J
P	PW-26A	TCA	UG/L	200	2.1	2.64	0.2 J	0.31 J	0.5 U	0.5 U	0.5 U	0.95	0.5 U	0.89	0.2 U	0.16 J	0.5 U	0.5 U	0.5 U
P	PW-29A	TCA	UG/L	200		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.28 J	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U
NHS	PW-47A	TCA	UG/L	200	68	3.84	0.08 J	0.08 J	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.63	0.34 J	0.27 J	0.5 U	0.5 U	0.5 U
NHS	PW-48A	TCA	UG/L	200	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.26 J		0.5 U			0.5 U
P	PW-49A	TCA	UG/L	200	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U					0.5 U
P	PW-57A	TCA	UG/L	200	42.1	0.09 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.2 U		0.5 U	0.5 U	0.5 U
NHS	PW-96A	TCA	UG/L	200		0.13 J	0.29 J	2.23 J	0.5 U	0.5 U	0.5 U	3.27	0.5 U	0.5 U	22.1	47.6	3.15	0.66	0.9
P	PW-97A	TCA	UG/L	200		12.8	4.61	2.54	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U
Recovery	EW-4	TCA	UG/L	200		3.27	0.76	1.02	0.5 U	0.5 U	0.5 U	1.44	0.41 J	0.5 U					0.5 U
Recovery	EW-5	TCA	UG/L	200		0.85	0.75	0.32 J	0.5 U	0.5 U	0.5 U	1.88	0.5 U	7.28					0.34 J
Recovery	EW-6	TCA	UG/L	200		0.5 U	1.67	0.29 J	0.5 U	0.5 U	0.5 U	0.59	0.5 U	0.5 U					0.5 U
P	PW-25A	DCA	UG/L	1280	6.5	2.53	1.74	0.5 U	0.5 U	0.5 U	0.5 U	1.72	1.13	4.12					1.22
P	PW-26A	DCA	UG/L	1280	1.4	3.25	0.4 J	0.35 J	0.5 U	0.5 U	0.5 U	0.59	0.5 U	0.2 J	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U
P	PW-29A	DCA	UG/L	1280		0.59	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.25 J	0.5 U	0.61	0.2 U	0.51	0.5 U	0.5 U	0.5 U
NHS	PW-47A	DCA	UG/L	1280	41.2	35.9	2.04	1.33	0.5 U	0.5 U	0.5 U	2.36	0.5 U	2.56	2.63	1.91	1.33	0.97	1.22
NHS	PW-48A	DCA	UG/L	1280	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U					0.5 U
P	PW-49A	DCA	UG/L	1280	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U					0.5 U
P	PW-57A	DCA	UG/L	1280	22.8	2.76	0.16 J	0.5 U	0.5 U	0.5 U	0.5 U	0.94	0.5 U	1.29	1.28	0.62	1.02	0.48 J	0.58
NHS	PW-96A	DCA	UG/L	1280		3.41	18.4	40.3	10.2	0.5 U	0.5 U	26	0.5 U	18.7	35.6	52.5	10.6	2.97	5.31
P	PW-97A	DCA	UG/L	1280		59.3	30.2	20.9	2.35	0.5 U	0.5 U	3.74	0.5 U	3.51	4.33	4.34	3.56	0.83	0.62
Recovery	EW-4	DCA	UG/L	1280		2.78	1	1.13	0.5 U	0.5 U	0.5 U	3.45	0.49 J	0.5 U					0.5 U
Recovery	EW-5	DCA	UG/L	1280		4.53	4.58	11.4	0.5 U	0.5 U	0.5 U	3.52	1.67	10.4					0.5
Recovery	EW-6	DCA	UG/L	1280		1.33	1.48	0.78	0.5 U	0.5 U	0.5 U	1.5	1.1	0.51					0.35 J
P	PW-25A	DCE	UG/L	7	2.6	0.51	0.36 J	0.5 U	0.5 U	0.5 U	0.5 U	0.43 J	0.28 J	1.03					0.34 J
P	PW-26A	DCE	UG/L	7	1 U	0.31 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U
P	PW-29A	DCE	UG/L	7		0.22 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.23 J	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U
NHS	PW-47A	DCE	UG/L	7	11.7	0.94	0.39 J	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.2 U	0.22 J	0.5 U	0.5 U	0.5 U
NHS	PW-48A	DCE	UG/L	7	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U					0.5 U
P	PW-49A	DCE	UG/L	7	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U					0.5 U
P	PW-57A	DCE	UG/L	7	8.1	0.11 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.17 J	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U
NHS	PW-96A	DCE	UG/L	7		0.42 J	1.13	0.88	0.5 U	0.5 U	0.5 U	0.59	0.5 U	0.37 J	1.88	3.22	0.27 J	0.5 U	0.5 U
P	PW-97A	DCE	UG/L	7		6.8	3.55	3.02	0.5 U	0.5 U	0.5 U	1.03	0.5 U	0.33 J	0.34 J	0.29 J	0.5 U	0.5 U	0.5 U
Recovery	EW-4	DCE	UG/L	7		0.36 J	0.21 J	0.17 J	0.5 U	0.5 U	0.5 U	0.39 J	0.5 U	0.5 U					0.5 U
Recovery	EW-5	DCE	UG/L	7		0.1 J	2.54	1.16	0.5 U	0.5 U	0.5 U	0.35 J	0.23 J	0.35 J					0.5 U
Recovery	EW-6	DCE	UG/L	7		1.44	0.31 J	0.58	0.5 U	0.5 U	0.5 U	1.83	0.34 J	0.5 U					0.5 U
P	PW-25A	cis-1,2-DCE	UG/L	70	1	0.6	0.27 J	0.5 U	0.5 U	0.5 U	0.5 U	0.24 J	0.5 U	0.49 J					0.5 U
P	PW-26A	cis-1,2-DCE	UG/L	70	1.6	1.32	0.54	0.1 J	0.5 U	0.5 U	0.5 U	0.2 U	0.51	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U
P	PW-29A	cis-1,2-DCE	UG/L	70		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U
NHS	PW-47A	cis-1,2-DCE	UG/L	70	6	9.7	2.25	1.06	0.5 U	0.5 U	0.5 U	2.34	0.5 U	3.22	2.32	2.03	1.47	1.09	1.47 0
NHS	PW-48A	cis-1,2-DCE	UG/L	70	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U					0.5 U
P	PW-49A	cis-1,2-DCE	UG/L	70	0.7 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U					0.5 U
P	PW-57A	cis-1,2-DCE	UG/L	70	4.5	1.06	0.66	0.46 J	0.5 U	0.5 U	0.5 U	1.2	0.5 U	2.22	2.06	1.21	1.28	0.66	0.51 0
NHS	PW-96A	cis-1,2-DCE	UG/L	70		2.12	3.8	10.9	0.98	0.5 U	0.5 U	3.66	0.5 U	11.3	34.8	66.6	4.25	1.24	3.38 0
P	PW-97A	cis-1,2-DCE	UG/L	70		13.2	5.59	3.89	0.5 U	0.5 U	0.5 U	1.88	0.5 U	0.59	0.69	0.99	0.65	0.29 J	0.29 J
Recovery	EW-4	cis-1,2-DCE	UG/L	70		1.65	1.06	0.86	0.5 U	0.5 U	0.5 U	2.73	0.5 U	0.5 U					0.5 U
Recovery	EW-5	cis-1,2-DCE	UG/L	70		0.9	2.44	2.59	0.5 U	0.5 U	0.5 U	2.11	1.12	5.98					0.27 J
Recovery	EW-6	cis-1,2-DCE	UG/L	70		6.53	1.57	0.95	0.5 U	0.5 U	0.5 U	0.89	0.74	0.29 J					0.78 0
P	PW-25A	PCE	UG/L	5	3	0.51	0.29 J	0.5 U	0.5 U	0.5 U	0.5 U	0.32 J	0.5 U	0.47 J					0.22 J
P	PW-26A	PCE	UG/L	5	1 U	0.27 J	0.5 U	0.27 J	0.5 U	0.5 U	0.5 U	0.3 J	0.5 U	0.14 J	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U
P	PW-29A	PCE	UG/L	5		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U
NHS	PW-47A	PCE	UG/L	5	5.5	0.42 J	0.16 J	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.2 U	0.17 J	0.5 U	0.5 U	0.5 U
NHS	PW-48A	PCE	UG/L	5	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U					0.5 U
P	PW-49A	PCE	UG/L	5	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U					0.5 U
P	PW-57A	PCE	UG/L	5	3.9	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U
NHS	PW-96A	PCE	UG/L	5		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U
P	PW-97A	PCE	UG/L	5		0.26 J	0.17 J	0.14 J	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U
Recovery	EW-4	PCE	UG/L	5		0.29 J	0.17 J	0.29 J	0.5 U	0.5 U	0.5 U	0.33 J	0.5 U	0.5 U					0.5 U
Recovery	EW-5	PCE	UG/L	5		0.18 J	0.44 J	0.5 U	0.5 U	0.5 U	0.5 U	0.28 J	0.5 U	0.48 J					0.22 J
Recovery	EW-6	PCE	UG/L	5		0.5 U	0.32 J	0.12 J	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.1 J					0.5 U
P	PW-25A	TCE	UG/L	5	6.5	1.22	0.61	0.5 U	0.5 U	0.5 U	0.5 U	0.76	0.44 J	1.54					0.49 J
P	PW-26A	TCE	UG/L	5	8.1	3.66	0.63	0.57	0.5 U	0.5 U	0.5 U	1.66	0.5 U	0.76	0.7	0.65	0.52	0.48 J	0.42 J
P	PW-29A	TCE	UG/L	5		0.2 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.2 J	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U
NHS	PW-47A	TCE	UG/L	5	38.4	1.94	1.18	0.76	0.5 U	0.5 U	0.5 U	1.23	0.5 U	1.46	2	1.6	0.82	0.65	0.42 J
NHS	PW-48A	TCE	UG/L	5	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U					0.5 U
P	PW-49A	TCE	UG/L	5	8.4	0.7	0.13 J	0.25 J	0.5 U	0.5 U	0.5 U	0.23 J	0.5 U	0.19 J					0.5 U
P	PW-57A	TCE	UG/L	5	32.8	0.23 J	0.33 J	0.31 J	0.5 U	0.5 U	0.5 U	0.68	0.5 U	0.77	0.81	0.31 J	0.64	0.2 J	0.58
NHS	PW-96A	TCE	UG/L	5		0.66	1.08	1.9	0.5 U	0.5 U	0.5 U	0.64	0.5 U	0.21 J	3.53	7.24	0.21 J	0.5 U	0.5 U
P	PW-97A	TCE	UG/L	5		9.98	4.73	4.58	0.5 U	0.5 U	0.5 U	1.23	0.5 U	0.45 J	0.2 U	0.32 J	0.2 J	0.5 U	0.5 U
Recovery	EW-4	TCE	UG/L	5		9.46	6.05	6.32	0.58	0.5 U	0.5 U	1.49	0.41 J	0.33 J					0.27 J
Recovery	EW-5	TCE	UG/L	5		0.53	4.32	1.24	0.5 U	0.5 U	0.5 U	0.73	1.77	4.77					1.13
Recovery	EW-6	TCE	UG/L	5		6	7.4	1.01	0.5 U	0.5 U	0.5 U	0.51	1.32	0.86					0.5 U
P	PW-25A	VC	UG/L	2	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U					0.5 U
P	PW-26A	VC	UG/L	2	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U
P	PW-29A	VC	UG/L	2		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U
NHS	PW-47A	VC	UG/L	2	1 U	1.25	0.58	0.5 U	0.5 U	0.5 U	0.5 U	0.95	0.5 U	0.73	0.4 J	0.25 J	0.42 J	0.5 U	0.27 J
NHS	PW-48A	VC	UG/L	2	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U					0.5 U
P	PW-49A	VC	UG/L	2	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U					0.5 U
P	PW-57A	VC	UG/L	2	1 U	0.59	0.17 J	0.5 U	0.5 U	0.5 U	0.5 U	0.26 J	0.5 U	0.63	0.2 U	0.49 J	0.5	0.34 J	0.5 U
NHS	PW-96A	VC	UG/L	2		1.1	2.93	7.25	0.28	0.5 U	0.5 U	1.43	0.5 U	4.03	7.46	9.29	2.03	0.89	1.98
P	PW-97A	VC	UG/L	2		3.02	1.7	0.93	0.5 U	0.5 U	0.5 U	0.6	0.5 U	0.29 J	0.2 U	0.62	0.38 J	0.19 J	0.25 J
Recovery	EW-4	VC	UG/L	2		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U					0.5 U
Recovery	EW-5	VC	UG/L	2	2 U	2.51	0.48 J	1.49	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.8					0.5 U
Recovery	EW-6	VC	UG/L	2		3.11	0.25 J	0.58	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U					0.7

NOTES

= detected value exceeds ROD Standard.

ROD standards are from Table 10-1 of the ROD. For most CVOCs, the level is equivalent to the drinking water MCL.

A risk-based level (non-cancer hazard index = 1 for industrial exposure) was calculated for DCA.

Well-specific human health risks are below "hot spot" levels at all South Extraction Area wells.

TCA = 1,1,1 Trichloroethane.

DCA = 1,1 Dichloroethane.

DCE = 1,1 Dichloroethene.

U = Constituent not detected above method detection limit.

J = Estimated concentration below method reporting limit.

E = Estimated value above calibration range.

Table D-1
Farm Ponds Area Historical Chlorinated Volatile Organic Compound Data

CVOC	ROD Standard	September 2000	October 2009	September 2010	September 2011	August 2012	August 2013	January 2015[5]	April 2016	
Monitoring Well PW-40S										
Tetrachloroethene	5	2.5	0.57	0.55	0.43 J	0.5 U	0.5 U	0.5 U	0.18	J
Trichloroethene	5	**15.9**	0.49 J	0.5 U	0.5 U	0.5 U	0.5 U	0.28 J	0.44	J
Cis 1,2-Dichlorethene	70	45	0.74	0.61	0.52	0.5 U	0.5 U	1.7	8.03	
Vinyl Chloride	2	**2.4**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.3	J
1,1,1-Trichloroethane	200	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5	U
1,1,2,2-PCA	0.175	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5	U
1,1,2-Trichloroethane	3	1 U	0.12 J	0.13 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5	U
1,1-Dichlorethane	810	45.8	14.3	12.7	9.8	5.3	2.6	3.7	6.45	
1,1-Dichlorethene	7	2.5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5	U
1,2-Dichlorethane	5	6.6	0.12 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.36	J
Monitoring Well SS[1]										
Tetrachloroethene	5	**22.5**	2.52	2.13	1.45	0.99				
Trichloroethene	5	**6.2**	0.26 J	0.25 J	0.5 U	0.5 U				
Cis 1,2-Dichlorethene	70	2.9	0.5 U	0.5 U	0.5 U	0.5 U				
Vinyl Chloride	2	1 U	0.5 U	0.5 U	0.5 U	0.5 U				
1,1,1-Trichloroethane	200	0.6 J	0.16 J	0.5 U	0.5 U	0.5 U				
1,1,2,2-PCA	0.175	**1.3**	0.1 J	0.5 U	0.5 U	0.5 U				
1,1,2-Trichloroethane	3	**5.8**	0.7	0.61	0.5 U	0.5 U				
1,1-Dichlorethane	810	2.3	0.33 J	0.29 J	0.5 U	0.5 U				
1,1-Dichlorethene	7	1 U	0.5 U	0.5 U	0.5 U	0.5 U				
1,2-Dichlorethane	5	1 U	0.5 U	0.5 U	0.5 U	0.5 U				
Monitoring Well SD[2]										
Tetrachloroethene	5					0.5 U	0.5 U	0.5 U		
Trichloroethene	5					0.5 U	0.5 U	0.5 U		
Cis 1,2-Dichlorethene	70					0.5 U	0.5 U	0.5 U		
Vinyl Chloride	2					0.5 U	0.5 U	0.5 U		
1,1,1-Trichloroethane	200					0.5 U	0.5 U	0.5 U		
1,1,2,2-PCA	0.175					0.5 U	0.5 U	0.5 U		
1,1,2-Trichloroethane	3					0.5 U	0.5 U	0.5 U		
1,1-Dichlorethane	810					0.5 U	0.5 U	0.5 U		
1,1-Dichlorethene	7					0.5 U	0.5 U	0.5 U		
1,2-Dichlorethane	5					0.5 U	0.5 U	0.5 U		
Monitoring Well PW-104S[3]										
Tetrachloroethene	5								**7.3**	
Trichloroethene	5								**19**	
Cis 1,2-Dichlorethene	70								41.6	
Vinyl Chloride	2								0.55	
1,1,1-Trichloroethane	200								0.5	U
1,1,2,2-PCA	0.175								**0.37**	J
1,1,2-Trichloroethane	3								**12.2**	
1,1-Dichlorethane	810								16.2	
1,1-Dichlorethene	7								1.52	
1,2-Dichlorethane	5								**6.09**	
Monitoring Well PW-108A[3]										
Tetrachloroethene	5								0.5	U
Trichloroethene	5								0.5	U
Cis 1,2-Dichlorethene	70								0.5	U
Vinyl Chloride	2								0.5	U
1,1,1-Trichloroethane	200								0.5	U
1,1,2,2-PCA	0.175								0.5	U
1,1,2-Trichloroethane	3								0.5	U
1,1-Dichlorethane	810								0.5	U
1,1-Dichlorethene	7								0.5	U
1,2-Dichlorethane	5								0.5	U
Monitoring Well PW-65S[4]										
Tetrachloroethene	5		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5	U
Trichloroethene	5		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5	U
Cis 1,2-Dichlorethene	70		0.11 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5	U
Vinyl Chloride	2		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5	U
1,1,1-Trichloroethane	200		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5	U
1,1,2,2-PCA	0.175		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5	U
1,1,2-Trichloroethane	3		0.12 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5	U
1,1-Dichlorethane	810		4.17	3.82	2.68	2.12	1.89	0.5 U	3.27	
1,1-Dichlorethene	7		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5	U
1,2-Dichlorethane	5		0.64	0.59	0.51	0.5 U	0.5 U	0.5 U	0.62	

Notes:

ug/L = microgram per liter

CVOC = chlorinated volatile organic compound

ROD = record of decision

U = the analyte was not detected above the reported sample quantification limit

J = estimated value below the reporting limit.

(highlighted) = detected value exceeds ROD Standard.

1 Monitoring well SS was decommissioned on September 30, 2012.

2 Monitoring well SD was first sampled in 2011 and decomissioned in August 2015.

3 Monitoring wells PW-104S and PW-108A were first sampled in 2016. PW-104S is a replacement for well SS and PW-108A is a replacement for well SD.

4 Monitoring well PW-65S was first sampled in 2007.

5 Monitoring event for 2014 was conducted in January 2015.

Source of Data through 2015 (GSI 2015h)

Source of Data through 2016 (GSI 2017a)

Table D-2
Farm Ponds Area Results for Wells Sampled Only in 2016
Volatile Organic Compounds

Monitoring Well	Chloromethane	Bromomethane	Vinyl Chloride	Chloroethane	Methylene Chloride	Acetone	Carbon Disulfide	1,1-Dichloroethylene	1,1-Dichloroethane	cis-1,2-Dichloroethylene	Chloroform	1,2-Dichloroethane	2-Butanone	1,1,1-Trichloroethane	Carbon Tetrachloride	Bromodichloromethane	1,2-Dichloropropane	cis-1,3-Dichloropropene
Unit	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
ROD Standard [1]	--	--	2	--	--	--	--	7	810	70	70	5	--	200	5	--	5	--
HW	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
ND	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
ND-1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
ND-2	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
NS	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
PW-35A	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
PW-36A	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
PW-37A	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
PW-38A	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
PW-39A	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
PW-40A	0.5 U	0.5 U	0.32 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.85	0.75	0.5 U	0.16 J	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
PW-43A	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
PW-43S	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
PW-44A	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
PW-44S	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
PW-64A	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
PW-64S	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
PW-65A	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
PW-66A	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
PW-66S	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
PW-67A	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
PW-67S	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
PW-105S	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.86	0.5 U	0.5 U	0.28 J	0.35 J	0.5 U	0.23 J	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
PW-106S	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.48	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
PW-107S	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
WD-1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.97	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
WD-2	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
WS	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.61	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

Monitoring Well	Trichloroethylene	Dibromochloromethane	1,1,2-Trichloroethane	Benzene	trans-1,3-Dichloropropene	Bromoform	4-Methyl-2-pentanone	2-Hexanone	Tetrachloroethylene	Toluene	1,1,2,2-Tetrachloroethane	Chlorobenzene	Ethyl Benzene	Styrene	Xylenes (Total)	Acrolein	Acrylonitrile	2-Chloroethylvinylether
Unit	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
ROD Standard [1]	5	60	3	5	--	--	--	--	5	1,000	0.175	100	--	100	10,000	--	--	--
HW	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	0.5 U	0.5 U
ND	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	0.5 U	0.5 U
ND-1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	0.5 U	0.5 U
ND-2	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	0.5 U	0.5 U
NS	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.71	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	0.5 U	0.5 U
PW-35A	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	0.5 U	0.5 U
PW-36A	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	0.5 U	0.5 U
PW-37A	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	0.5 U	0.5 U
PW-38A	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	0.5 U	0.5 U
PW-39A	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	0.5 U	0.5 U
PW-40A	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	0.5 U	0.5 U
PW-43A	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	0.5 U	0.5 U
PW-43S	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	0.5 U	0.5 U
PW-44A	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	0.5 U	0.5 U
PW-44S	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	0.5 U	0.5 U
PW-64A	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	0.5 U	0.5 U
PW-64S	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	0.5 U	0.5 U
PW-65A	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	0.5 U	0.5 U
PW-66A	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	0.5 U	0.5 U
PW-66S	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	0.5 U	0.5 U
PW-67A	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	0.5 U	0.5 U
PW-67S	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	0.5 U	0.5 U
PW-105S	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	0.5 U	0.5 U
PW-106S	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	0.5 U	0.5 U
PW-107S	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	0.5 U	0.5 U
WD-1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	0.5 U	0.5 U
WD-2	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	0.5 U	0.5 U
WS	0.36 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.2 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.5 U	0.5 U	0.5 U	0.5 U

Notes:

1 ROD standards are derived from multiple sources; see Table B-4 of the Quality Assurance Project Plan (Sitewide QAPP) for details.

µg/L = microgram per liter.

J = estimated value below the reporting limit.

U = analyte was not detected above the reporting limit.

= detected value exceeds ROD Standard.

Source of Data through 2016 (GSI 2017a)

Table D-3
Farm Ponds Area Results for Wells Sampled Only in 2016
Total Metals

Monitoring Well	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Copper	Cyanide	Iron	Lead
Unit	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
ROD Standard[1]	--	6	10	2,000	1	5	--	100	1,000	200	--	--
HW	16.8	0.18 U	0.5	22.3	0.5 U	0.5 U	25,200	0.18 J	1.45 J	5 U	778	0.35 J
ND	10 U	0.18 U	2.36	11.2	0.5 U	0.5 U	19,100	1 U	11.4	1.91 J	422	0.5 U
ND-1	10 U	0.062 J	0.84	30.2	0.5 U	0.5 U	19,500	1 U	2 U	5 U	519	0.5 U
ND-2	13.9	0.5 U	0.76	22.1	0.5 U	0.5 U	23,800	1 U	2 U	5 U	19 J	0.5 U
NS	13.4	0.18 U	0.24 J	46.8	0.5 U	0.5 U	73,400	0.32 J	2 U	10.3	18.9 J	0.5 U
PW-35A	18.7	0.11 J	0.14 J	26.1	0.5 U	0.5 U	20,900	0.32 J	2 U	5 U	26.4 J	0.5 U
PW-36A	20.2	0.046 J	0.25 J	78.7	0.5 U	0.5 U	23,700	1 U	2 U	5 U	25.9 J	0.5 U
PW-37A	10 U	0.087 J	21.1	14.8	0.5 U	0.5 U	38,300	0.26 J	2 U	5 U	293	0.5 U
PW-38A	10 U	0.18 U	1.2	6.21	0.5 U	0.5 U	18,500	1 U	2 U	5 U	100 U	0.5 U
PW-39A	5.6 J	0.18 J	0.21 J	11.8	0.5 U	0.5 U	23,700	1 U	2 U	5 U	184	0.045 J
PW-40A	5.33 J	0.5 U	4.42	26.8	0.5 U	0.5 U	108,000	1 U	2 U	9.63	885	0.5 U
PW-43A	6.5 J	0.039 J	1.43	26.2	0.5 U	0.5 U	37,500	1 U	2 U	5 U	53.9 J	0.5 U
PW-43S	10 U	0.053 J	2.01	112	0.5 U	0.5 U	202,000	5.05	2 U	5 U	100 U	0.5 U
PW-44A	4.1 J	0.076 J	5.72	14.1	0.5 U	0.5 U	41,700	1 U	2 U	5 U	74.5 J	0.5 U
PW-44S	10 U	0.11 J	4.75	64.9	0.5 U	0.5 U	102,000	2.24	2 U	5 U	100 U	0.5 U
PW-64A	10 U	0.17 J	3.42	37	0.5 U	0.5 U	22,900	1 U	2 U	5 U	3,860	0.5 U
PW-64S	10 U	0.14 J	6.25	22.9	0.5 U	0.5 U	42,300	0.11 J	2 U	2.84 J	34.4 J	0.5 U
PW-65A	10 U	0.033 J	2.97	19.2	0.5 U	0.5 U	34,700	1 U	2 U	5 U	55.5 J	0.5 U
PW-66A	3.84 J	0.043 J	2.78	12.3	0.5 U	0.5 U	31,000	1 U	2 U	5 U	326	0.5 U
PW-66S	3.83 J	0.076 J	3.4	80.1	0.5 U	0.5 U	161,000	0.15 J	2 U	5 U	16.6 J	0.5 U
PW-67A	260	0.14 J	4.73	132	0.062 J	0.076 J	70,300	0.41 J	2 U	1.57 J	4,570	0.91
PW-67S	10 U	0.076 J	1.86	149	0.5 U	0.5 U	168,000	0.44 J	2 U	5 U	11.6 J	0.5 U
PW-105S	22.3	0.14 J	0.33 J	172	0.5 U	0.5 U	35,100	0.44 J	2 U	5 U	70.8 J	0.5 U
PW-106S	9120	0.32 U	5.19	170	0.31 J	0.2 J	27,700	14.5	19.8	5 U	11,600	4.82
PW-107S	100	0.24 J	0.19 J	83.8	0.5 U	0.5 U	27,600	0.52 J	2 U	5 U	145	0.061 J
WD-1	10 U	0.11 U	3.27	12.8	0.5 U	0.5 U	61,000	1 U	4 U	2.84 J	25.2 J	0.5 U
WD-2	10 U	0.5 U	2.65	12.9	0.5 U	0.5 U	35,600	1 U	2 U	5 U	61.6 J	0.5 U
WS	4.23 J	0.18 U	0.71	51.3	0.5 U	0.5 U	214,000	0.13 J	3.48	46.5	18.4 J	0.5 U

Monitoring Well	Magnesium	Manganese	Mercury	Nickel	Selenium	Silver	Sodium	Thallium	Thorium	Tin	Uranium	Zinc
Unit	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	mg/L	µg/L
ROD Standard[1]	--	50	2	--	50	--	--	2	--	--	0.03	--
HW	10,300	89.6	0.1 U	1.33	0.2 J	0.5 U	22,100	0.2 U	0.005 U	25 U	0.0005 U	15.5
ND	10,300	124	0.1 U	0.49 J	0.15 J	0.5 U	25,600	0.2 U	0.005 U	25 U	0.0005 U	13.7
ND-1	10,700	31.8	0.1 U	0.41 J	0.32 J	0.5 U	25,200	0.2 U	0.005 U	25 U	0.0005 U	2.83 U
ND-2	12,800	3.82	0.1 U	0.48 J	0.4 J	0.5 U	25,100	0.2 U	0.005 U	25 U	0.0005 U	3.08 U
NS	26,900	1.89	0.1 U	6.68	0.26 J	0.5 U	36,800	0.2 U	0.005 U	25 U	0.0009	3.02 J
PW-35A	11,600	30.2	0.1 U	0.33 J	0.14 J	0.5 U	27,200	0.2 U	0.005 U	25 U	0.0005 U	4.06 U
PW-36A	9,400	175	0.1 U	3.43	0.3 J	0.5 U	17,700	0.2 U	0.005 U	25 U	0.0005 U	2.89 J
PW-37A	17,900	766	0.1 U	1.18	0.24 J	0.5 U	30,800	0.2 U	0.005 U	25 U	0.0005 U	10 U
PW-38A	9,070	144	0.1 U	0.41 J	0.14 J	0.5 U	23,100	0.2 U	0.005 U	25 U	0.0005 U	2.54 J
PW-39A	10,300	97.2	0.1 U	0.98	0.21 J	0.5 U	17,500	0.2 U	0.005 U	25 U	0.0005 U	2.8 J
PW-40A	39,800	1,780	0.1 U	4.52	0.54	0.5 U	46,900	0.2 U	0.005 U	12.2 J	0.0005 U	3.03 J
PW-43A	17,000	2,080	0.1 U	1.12	0.24 J	0.5 U	22,800	0.2 U	0.005 U	25 U	0.0005 U	2.82 J
PW-43S	81,000	0.64	0.1 U	4.24	1.01	0.5 U	26,500	0.2 U	0.005 U	26.1	0.0002 J	3.58 J
PW-44A	20,300	494	0.1 U	1.05	0.33 J	0.2 J	25,600	0.2 U	0.005 U	25 U	0.0002 J	2.55 J
PW-44S	35,300	0.68	0.1 U	9.12	0.64	0.5 U	26,400	0.2 U	0.005 U	10.9 J	0.0004 J	2.85 J
PW-64A	12,200	359	0.1 U	0.51	0.22 J	0.093 J	29,600	0.2 U	0.005 U	25 U	0.0005 U	3.42 U
PW-64S	18,100	293	0.1 U	0.84	0.21 J	0.5 U	25,300	0.2 U	0.005 U	25 U	0.0005 U	4.01 U
PW-65A	17,700	998	0.1 U	0.65	0.24 J	0.5 U	32,000	0.2 U	0.005 U	25 U	0.0001 J	3.01 U
PW-66A	15,600	1,460	0.1 U	0.63	0.25 J	0.5 U	27,200	0.2 U	0.005 U	25 U	0.0004 J	2.72 J
PW-66S	57,000	78.7	0.1 U	2.98	0.68	0.5 U	23,700	0.2 U	0.005 U	19.3 J	0.0007	2.85 J
PW-67A	35,800	3,720	0.1 U	1.31	0.23 J	0.5 U	40,600	0.2 U	0.005 U	25 U	0.0002 J	3.86 U
PW-67S	68,400	180	0.1 U	4.79	0.39 J	0.5 U	31,500	0.2 U	0.005 U	23.6 J	0.0007	2.97 U
PW-105S	18,600	607	0.1 U	3.16	0.45 J	0.5 U	38,900	0.2 U	0.005 U	25 U	0.0005	4.09 J
PW-106S	15,700	1,870	0.1 U	9.54	0.42 J	0.21 J	37,500	0.1 J	0.005 U	25 U	0.0005	33.6
PW-107S	15,000	499	0.1 U	2.64	1.41	0.5 U	33,000	0.028 J	0.005 U	25 U	0.0003 J	6.71 U
WD-1	26,500	980	0.1 U	2.15	0.11 J	0.5 U	39,600	0.2 U	0.005 U	25 U	0.0001 J	4.56 U
WD-2	17,500	1,190	0.1 U	1.17	0.26 J	0.5 U	31,600	0.2 U	0.005 U	25 U	0.0001 J	2.59 J
WS	72,600	23.2	0.1 U	9.45	0.8	0.04 J	93,500	0.2 U	0.005 U	27.3	0.0002 J	3.57 J

Notes:

1 ROD standards are derived from multiple sources; see Table B-4 of the Quality Assurance Project Plan (Sitewide QAPP) for details.

µg/L = microgram per liter.

J = estimated value below the reporting limit.

mg/L = milligram per liter.

U = analyte was not detected above the reporting limit.

= detected value exceeds ROD Standard.

Source of Data through 2016 (GSI 2017a)

Table E-1
Solids Area Groundwater Data 2009 to 2016

Station	Parameter	ROD Standard[1]	Units	September 2009	September 2010	September 2011	September 2012	August 2013	January 2015 [5]	Spring 2016
PW-07	TOTAL MANGANESE	none[2,3]	mg/L	0.6	0.55	0.53	0.49			0.545
PW-09	TOTAL MANGANESE	none[2,3]	mg/L	5.1	4.9	4.7	3.6			2.42
PW-17B	TOTAL MANGANESE	none[2,3]	mg/L	7.6	7.2	6.8	6.2			8.27
PW-18B	TOTAL MANGANESE	none[2,3]	mg/L	0.23	0.19	0.17	0.15			0.0195
PWA-1	TOTAL MANGANESE	none[2,3]	mg/L	7.9	8.1	7.7	7.7			6.31
PWA-2	TOTAL MANGANESE	none[2,3]	mg/L	13	12.1	12	11.1			8.12
PWB-1	TOTAL MANGANESE	none[2,3]	mg/L	0.8	0.7	0.6	0.61			2.31
PWB-2	TOTAL MANGANESE	none[2,3]	mg/L	0.84	0.77	0.73	0.69			2.32
PWB-3	TOTAL MANGANESE	none[2,3]	mg/L	13	12	10	9.1			20.2
PWC-1	TOTAL MANGANESE	none[2,3]	mg/L	0.98	0.87	0.79	0.73			1.34
PWC-2	TOTAL MANGANESE	none[2,3]	mg/L	0.97	0.89	0.86	0.84			0.937
PWD-1	TOTAL MANGANESE	none[2,3]	mg/L	8.3	8.1	7.5	7.2			6.33
PWD-2	TOTAL MANGANESE	none[2,3]	mg/L	1.2	1	0.98	0.66			1.87
PWE-1	TOTAL MANGANESE	none[2,3]	mg/L	1.1	0.99	0.85	0.72			2.21
PWE-2	TOTAL MANGANESE	none[2,3]	mg/L	5.1	4.9	4.6	4.3			11.8
PWF-1	TOTAL MANGANESE	none[2,3]	mg/L	2.3	1.8	1.8	1.6			2.33
PWF-2	TOTAL MANGANESE	none[2,3]	mg/L	2.7	2.4	2.3	2			2.73
PW-07	FLUORIDE	2	mg/L	1 U	1 U	1 U	1 U	1 U	0.163 J	0.173 J
PW-09	FLUORIDE	2	mg/L	2	1 U	1 U	1 U	1 U		1.69
PW-17B	FLUORIDE	2	mg/L	1 U	1 U	1 U	1 U	1 U	0.472 J	1.06
PW-18B	FLUORIDE	2	mg/L	2	2	1.8	1.4	1.36	0.458 J	1.96
PWA-1	FLUORIDE	2	mg/L							0.22 J
PWA-2	FLUORIDE	2	mg/L							1 U
PWB-1	FLUORIDE	2	mg/L	2	2	2	2	1.89	1.33	1.36
PWB-2	FLUORIDE	2	mg/L	2	1 U	1 U	1 U	1 U	1.22	1.48
PWB-3	FLUORIDE	2	mg/L	2	2	1.7	1.5	1.48	1.79	10.4
PWC-1	FLUORIDE	2	mg/L							0.34 J
PWC-2	FLUORIDE	2	mg/L							0.29 J
PWD-1	FLUORIDE	2	mg/L							0.063 J
PWD-2	FLUORIDE	2	mg/L							0.135 J
PWE-1	FLUORIDE	2	mg/L	3.9	2.7	2.1	2	1.93		2.67
PWE-2	FLUORIDE	2	mg/L	1 U	1 U	1 U	1 U	1 U		0.053 J
PWF-1	FLUORIDE	2	mg/L							0.274 J
PWF-2	FLUORIDE	2	mg/L							0.122 J
PW-07	NITRATE	10	mg/L	5 U	5 U	5 U	5 U	5 U	9.14	2.58
PW-09	NITRATE	10	mg/L							0.094 U
PW-17B	NITRATE	10	mg/L							0.0948 J
PW-18B	NITRATE	10	mg/L							0.18
PWA-1	NITRATE	10	mg/L							0.099 J
PWA-2	NITRATE	10	mg/L							0.097 J
PWB-1	NITRATE	10	mg/L							0.18
PWB-2	NITRATE	10	mg/L							0.1
PWB-3	NITRATE	10	mg/L							0.1 U
PWC-1	NITRATE	10	mg/L							0.14
PWC-2	NITRATE	10	mg/L							0.1 U
PWD-1	NITRATE	10	mg/L							0.09 U
PWD-2	NITRATE	10	mg/L							0.115 U
PWE-1	NITRATE	10	mg/L							0.1 U
PWE-2	NITRATE	10	mg/L							0.1 U
PWF-1	NITRATE	10	mg/L	5 U	5 U	5 U	5 U	5 U	1.38	2.31
PWF-2	NITRATE	10	mg/L	5 U	5 U	5 U	5 U	5 U	0.016	0.1 U
PW-07	RADIUM 226	5[4]	pCi/L	**40** U	**5** U	2.5 U	2.5 U	2.5 U	1.0	0.21
PW-07	RADIUM 228	5[4]	pCi/L	**40** U	**5** U	2.5 U	2.5 U	2.5 U	0.35	0.69
PW-07	CHLORIDE	none[3]	mg/L	27	25	24	21			28.3
PW-09	CHLORIDE	none[3]	mg/L	670	590	575	555			71.9
PW-17B	CHLORIDE	none[3]	mg/L	820	808	785	716			526
PW-18B	CHLORIDE	none[3]	mg/L	45	50	45	41			15
PWA-1	CHLORIDE	none[3]	mg/L	1.6	1.4	1.2	1.1			1060
PWA-2	CHLORIDE	none[3]	mg/L	3	2	1.6	1.7			1790
PWB-1	CHLORIDE	none[3]	mg/L	53	48	42	32			60.8
PWB-2	CHLORIDE	none[3]	mg/L	51	47	43	19			60.6
PWB-3	CHLORIDE	none[3]	mg/L	4.7	4.1	3.8	3.3			1030
PWC-1	CHLORIDE	none[3]	mg/L	10	9	7.6	7.2			13.2
PWC-2	CHLORIDE	none[3]	mg/L	13	11	10	9			12.4
PWD-1	CHLORIDE	none[3]	mg/L	1780	1580	1430	1260			1460
PWD-2	CHLORIDE	none[3]	mg/L	592	575	525	510			1330
PWE-1	CHLORIDE	none[3]	mg/L	95	94	92	88			134
PWE-2	CHLORIDE	none[3]	mg/L	1520	1460	1380	1160			1200
PWF-1	CHLORIDE	none[3]	mg/L	1.1	1.2	1.1	1.1			659
PWF-2	CHLORIDE	none[3]	mg/L	1.4	1.1	1.1	1.1			1280

Notes:
mg/L = milligrams per liter
pCi/L = picoCuries per liter
U = The analyte was not detected above the reported sample quantification limit
J = The analyte was detected above the method detection limit and below the method reporting limit, and is considered an estimated value.
= detected value exceeds ROD Standard.
= detection limit greater than ROD Standard
[1] ROD standards are from Table 10-1 of the ROD.
[2] Environmental Quality Commission (EQC) revised Oregon's water quality criteria for manganese on December 9,2010, and withdrew the "water and fish ingestion" and "fish consumption only" criteria as they
[3] In 2013, manganese and chloride were removed from the analyte list.
[4] Radium exceeds if total of R226 and R228 exceeds 5 pCi/L.
[5] Monitoring event for 2014 was conducted in January 2015.
Source of Data through 2015 (GSI 2015i)
Source of Data through 2016 (GSI 2017a)

Table E-2
Solids Areas Results for Wells Sampled Only in 2016, Total Metals

Monitoring Well	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Copper	Cyanide	Iron Only	Lead	Magnesium	Manganese	Mercury	Nickel	Selenium	Silver	Sodium	Thallium	Thorium	Tin	Uranium	Zinc
Unit	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	mg/L	µg/L
ROD Standard[1]	--	6	10	2,000	1	5	--	100	1,000	200	--	--	--	50	2	--	50	--	--	2	--	--	0.03	--
PW-07	18.1 J	0.0699 J	0.168 J	21.2	1 U	1 U	26,500	2 U	4 U	11.1	2,320	1 U	7,850	545	0.1 U	9	1 U	1 U	13,400	0.4 U	0.005 U	25 U	0.0005 J	4 UJ
PW-09	6,710	0.79	5.77	123	0.25 J	1.82	93,900	3.91	56.9 J	3.26 J	11,300	3.06	33,600	2,420	0.086 J	8.94	0.66	0.31 J	24,400	0.059 J	0.005 U	25 U	0.0005	50 U
PW-17B	41.9	0.0488 J	9.41	256	0.5 U	0.5 U	103,000	0.257 J	3.44	2.44 J	45,000	0.5 U	137,000	8,270	0.1 U	4.18	0.533	0.5 U	72,200	0.2 U	0.005 U	18.7 J	0.0005 U	20 U
PW-18B	276	0.053 J	0.078 J	5.95	0.09 J	0.5 U	19,700	0.2 J	1.16 J	3.46 J	88.4 J	0.5 U	7,570	19.5	0.1 U	2.82	0.13 J	0.5 U	12,800	0.2 U	0.005 U	25 U	0.0005 U	108
PWA-1	10 U	0.5 U	2.81	284	0.5 U	0.5 U	165,000	0.21 J	3.58	5 UJ	29,300	0.5 U	286,000	6,310	0.1 U	11.5	0.4 J	0.5 U	117,000	0.2 U	0.005 U	15.1 J	0.0005 U	4.35 J
PWA-2	10 U	0.058 J	3	405	0.5 U	0.5 U	259,000	0.13 J	3.3	5 UJ	34,000	0.5 U	441,000	8,120	0.1 U	15.7	0.65	0.5 U	146,000	0.2 U	0.005 U	25 U	0.0005 U	6.65 U
PWB-1	10 U	0.031 J	10.1	87.6	0.5 U	0.5 U	39,600	0.21 J	10 U	2.44 J	11,700	0.045 J	52,400	2,310	0.1 U	1.6	0.35 J	0.5 U	32,700	0.2 U	0.005 U	14.6 J	0.0005 U	5.09 U
PWB-2	10 U	0.5 U	14.2	94.7	0.5 U	0.5 U	39,400	0.19 J	10 U	2.64 J	23,800	0.5 U	50,400	2,320	0.1 U	1.65	0.32 J	0.5 U	32,200	0.2 U	0.005 U	15 J	0.0005	6.76 U
PWB-3	100 U	5 U	1.68 J	303	5 U	5 U	1,100,000	1.16 J	37.6 J	5 UJ	58,600	5 U	2,300,000	20,200	0.1 U	54.8	2.45 J	5 U	562,000	2 U	0.005 U	271	0.0005	3.34 U
PWC-1	9.93 U	0.086 J	1.5	158	0.038 J	0.5 U	107,000	1 U	2 U	5 U	20,800	0.5 U	43,100	1,340	0.1 U	13.4	0.47 J	0.5 U	66,700	0.2 U	0.005 U	25 U	0.0005 J	3.84 U
PWC-2	9.49 U	0.089 J	1.11	201	0.025 J	0.5 U	123,000	1 U	1.46 J	5 U	15,000	0.5 U	36,100	937	0.1 U	4.39	0.4 J	0.5 U	71,400	0.2 U	0.005 U	25 U	0.0005 U	52.8 J
PWD-1	50 U	0.16 J	2.82	390	2.5 U	2.5 U	315,000	5 U	10 U	5 U	100,000	2.5 U	175,000	6,330	0.1 U	6.95	1.03 J	2.5 U	134,000	1 U	0.005 U	20.3 J	0.0005 U	3.55 U
PWD-2	10 U	0.5 U	2.54	537	0.5 U	0.5 U	449,000	0.11 J	8.08	2.64 J	9,440	0.5 U	79,800	1,870	0.1 U	7.31	1.69	0.5 U	216,000	0.2 U	0.005 U	24.8 J	0.0005 U	3.45 U
PWE-1	5.19 J	0.041 J	10.3	53.7	0.5 U	0.5 U	50,300	0.39 J	2 U	4.03 J	6,710	0.5 U	38,500	2,210	0.1 U	1.26	0.24 J	0.5 U	21,200	0.2 U	0.005 U	13.4 J	0.0005 U	16.6 J
PWE-2	17.4 J	2.5 U	0.38 J	300	2.5 U	2.5 U	253,000	0.72 J	10 U	2.08 J	148,000	2.5 U	202,000	11,800	0.1 U	1.77 J	0.7 J	2.5 U	66,800	1 U	0.005 U	30.4	0.0005 U	3.42 J
PWF-1	16.3 J	0.212 J	1.27 J	117	2.5 U	2.5 U	315,000	5 U	10 U	275	6,080	2.5 U	112,000	2,330	0.1 U	9.42	0.6 J	2.5 U	34,200	1 U	0.005 U	22.6 J	0.0005 J	15.9 J
PWF-2	50 U	2.5 U	2.54	205	2.5 U	2.5 U	554,000	5 U	10 U	323	10,900	2.5 U	151,000	2,730	0.1 U	12.5	1.43 J	2.5 U	48,500	1 U	0.005 U	37.4	0.0005 U	17.8 J

Notes:

1 Cleanup levels are derived from multiple sources; see Table B-4 of the Quality Assurance Project Plan (Sitewide QAPP) for details.

µg/L = microgram per liter.

J = estimated value below the reporting limit.

mg/L = milligram per liter.

U = analyte was not detected above the reporting limit.

= detected value exceeds cleanup level.

Table E-3
Solids Areas Results for Wells Sampled Only in 2016
Radium-226/228

Monitoring Well	Radium-226	Radium-228
Unit	pCi/L	pCi/L
ROD Standard[1]	5	
PW-07	0.21	0.69
PW-09[(2)]		
PW-17B	0.54	-0.01
PW-18B	0.14	0.08
PWA-1	0.41	-0.18
PWA-2	0.56	0.22
PWB-1	0.05	0.57
PWB-2	0.11	0.3
PWB-3	1.5	5.5
PWC-1	0.83	0.04
PWC-2	1.6	0.38
PWD-1	0.2	0.42
PWD-2	1	0.08
PWE-1	0.11	-0.04
PWE-2	0.37	0.45
PWF-1	0.41	0.33
PWF-2	1.6	1.5

Notes:

1 Cleanup level is a combined concentration of radium-226 and radium-228.

2 Insufficient volume for sample collection.

pCi/L = picocurie per liter.

[highlighted] = detected value exceeds cleanup level.

Source of Data GSI 2017a

Table F-1
Surface Water Data, Chlorinated Volatile Organic Compounds 2009 to 2016

			Cleanup Level[1]	May 2009	December 2009	April 2010	November 2010	Spring 2011	Fall 2011	Spring 2012	Fall 2012	Spring 2013	Fall 2013	Spring 2014	Fall 2014[2]	Spring 2015	April 2016
MC-U (Upstream)																	
1,1,1-TCA	1,1,1-Trichloroethane	µg/L	18,000	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-DCA	1,1-Dichloroethane	µg/L	--	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-DCE	1,1-Dichloroethene	µg/L	11,600	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Cis 1,2-DCE	Cis-1,2-Dichloroethene	µg/L	11,600	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
PCE	Tetrachloroethene	µg/L	840	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TCE	Trichloroethene	µg/L	21,900	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Vinyl Chloride	Vinyl chloride	µg/L	--	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
MC-M (Mid-stream)																	
1,1,1-TCA	1,1,1-Trichloroethane	µg/L	18,000														0.17 J
1,1-DCA	1,1-Dichloroethane	µg/L	--														0.5 U
1,1-DCE	1,1-Dichloroethene	µg/L	11,600														0.5 U
Cis 1,2-DCE	Cis-1,2-Dichloroethene	µg/L	11,600														0.5 U
PCE	Tetrachloroethene	µg/L	840														0.5 U
TCE	Trichloroethene	µg/L	21,900														0.5 U
Vinyl Chloride	Vinyl chloride	µg/L	--														0.5 U
MC-D (Downstream)																	
1,1,1-TCA	1,1,1-Trichloroethane	µg/L	18,000	0.36 J	0.1 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.3 J	0.45 J	0.5 U	0.52	0.23 J
1,1-DCA	1,1-Dichloroethane	µg/L	--	0.13 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.18 J	0.5 U	0.2 J	0.5 U
1,1-DCE	1,1-Dichloroethene	µg/L	11,600	0.1 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.17 J	0.5 U
Cis 1,2-DCE	Cis-1,2-Dichloroethene	µg/L	11,600	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
PCE	Tetrachloroethene	µg/L	840	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TCE	Trichloroethene	µg/L	21,900	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Vinyl Chloride	Vinyl chloride	µg/L	--	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TC-U (Upstream)																	
1,1,1-TCA	1,1,1-Trichloroethane	µg/L	18,000	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-DCA	1,1-Dichloroethane	µg/L	--	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-DCE	1,1-Dichloroethene	µg/L	11,600	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Cis 1,2-DCE	Cis-1,2-Dichloroethene	µg/L	11,600	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
PCE	Tetrachloroethene	µg/L	840	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TCE	Trichloroethene	µg/L	21,900	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Vinyl Chloride	Vinyl chloride	µg/L	--	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TC-D (Downstream)																	
1,1,1-TCA	1,1,1-Trichloroethane	µg/L	18,000	0.09 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.54	0.5 U	0.28 J	0.5 U
1,1-DCA	1,1-Dichloroethane	µg/L	--	0.5 U	0.5 U	0.5 U	0.07 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.29 J	0.5 U	0.5 U	0.5 U
1,1-DCE	1,1-Dichloroethene	µg/L	11,600	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.75	0.5 U	0.29 J	0.5 U
Cis 1,2-DCE	Cis-1,2-Dichloroethene	µg/L	11,600	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.46	0.5 U	0.49 J	0.5 U
PCE	Tetrachloroethene	µg/L	840	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TCE	Trichloroethene	µg/L	21,900	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.24 J	0.5 U	0.5 U	0.5 U
Vinyl Chloride	Vinyl chloride	µg/L	--	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.31 J	0.5 U	0.21 J	0.5 U

Notes:
ug/L = microgram per liter
mg/L = milligram per liter
ROD = record of decision
U = the analyte was not detected above the method reporting limit
J = estimated value below the reporting limit.
1 Cleanup levels from Oregon Administrative Rule OAR 340-041-0033 (equivalent to Federal Ambient Water Quality Criteria); see Table B-4 of the Quality Assurance Project Plan (Sitewide QAPP) for details.
2 The Fall 2014 sampling even was conducted in January and February 2015.
Surface water data was not provided for 2006 or 2011

APPENDIX G
TREND CHARTS

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Figure G-1. DCE Concentrations, Acid Sump Area Hot Spot Wells

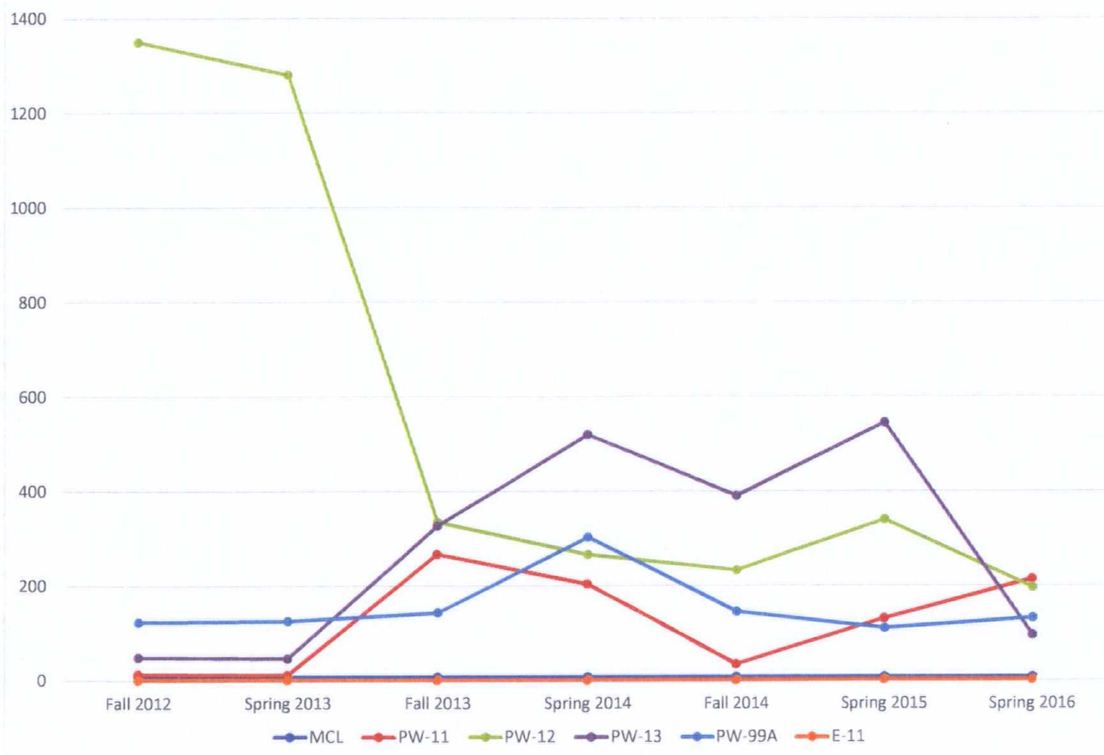

Figure G-2. DCE Concentrations, Material Recycle Area Hot Spot Wells

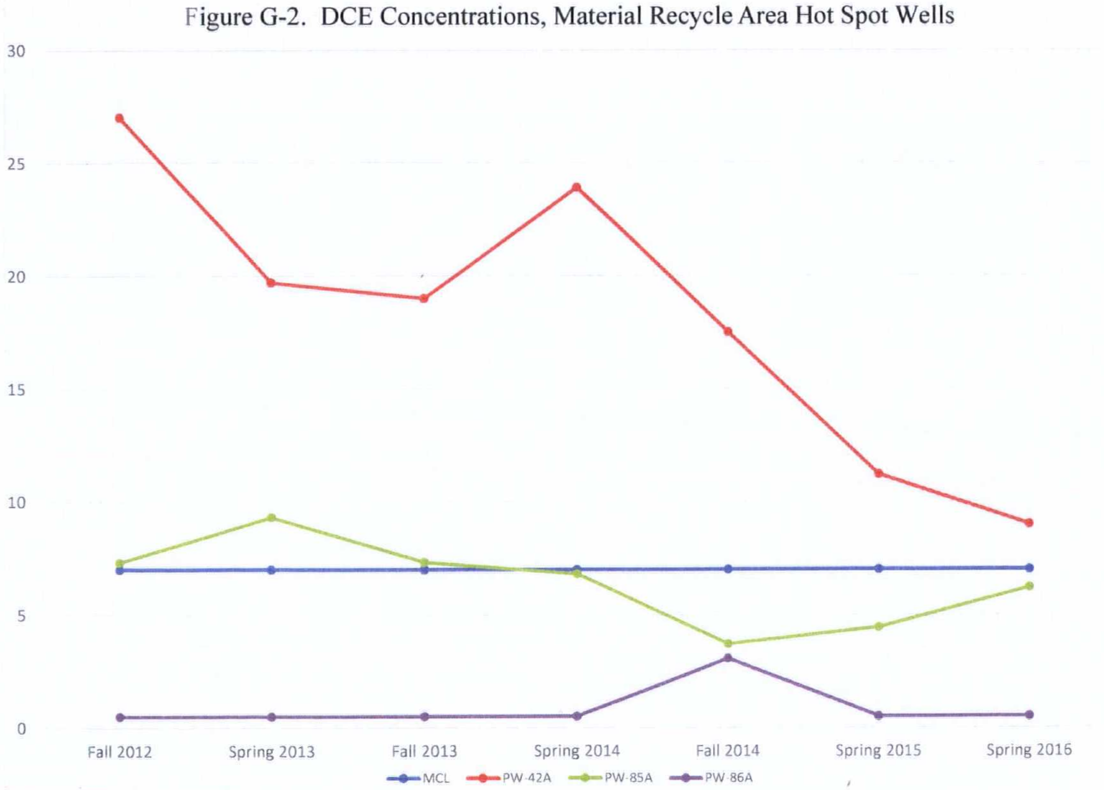

Figure G-3 DCE Concentrations, Ammonium Sulfate Storage Area Hot Spot Wells

Figure G-4. DCE Concentrations, Former Crucible Cleaning Area Hot Spot Wells

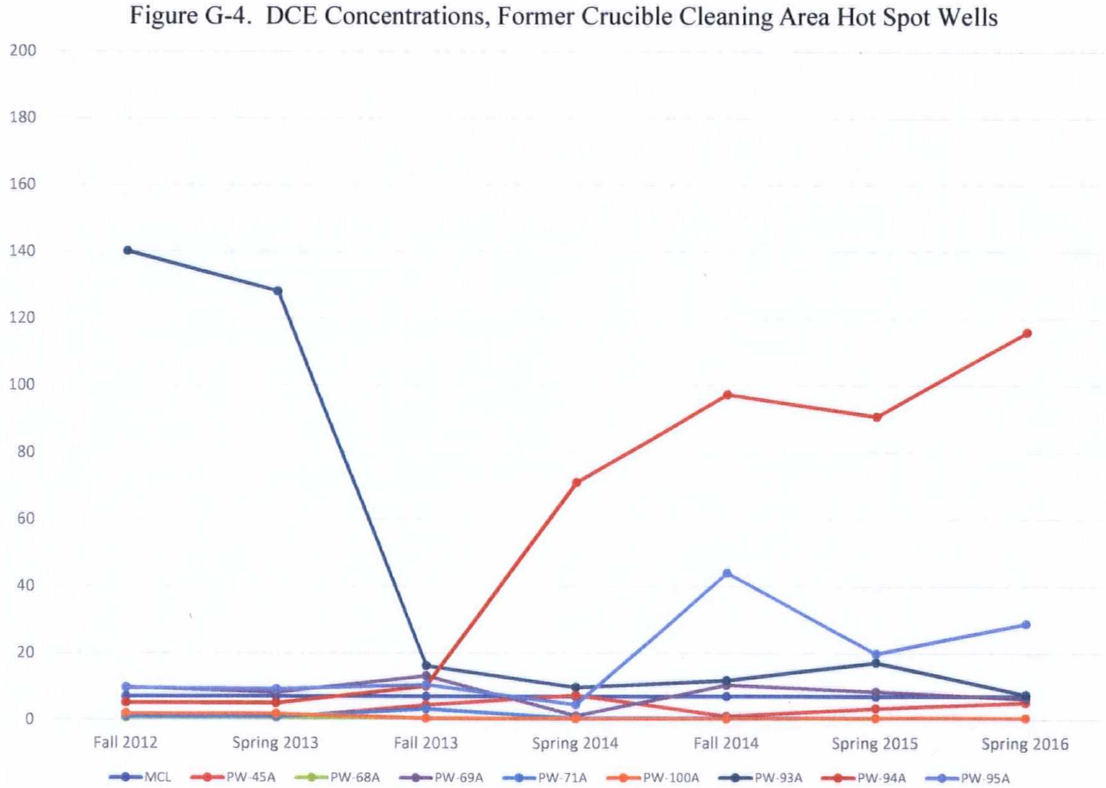

Figure G-5. DCE Concentrations, Dump Master Area ot Spot Wells

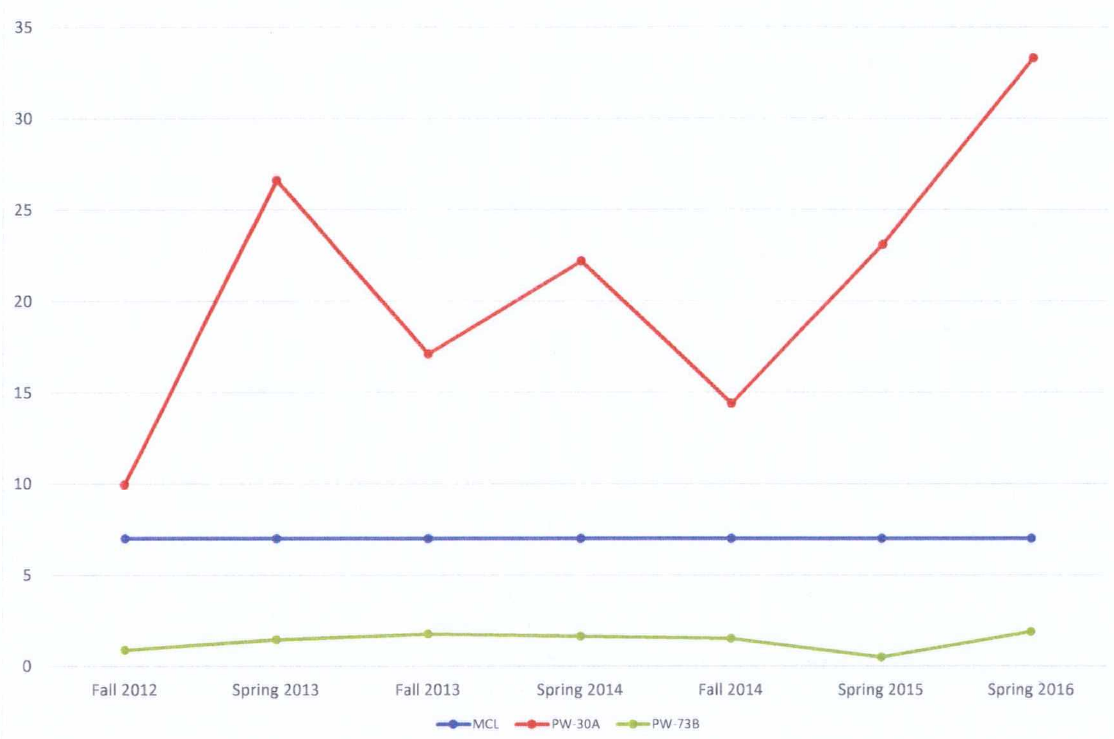

Figure G-6. DCE Concentrations, Perimeter Wells (Acid Sump Area)

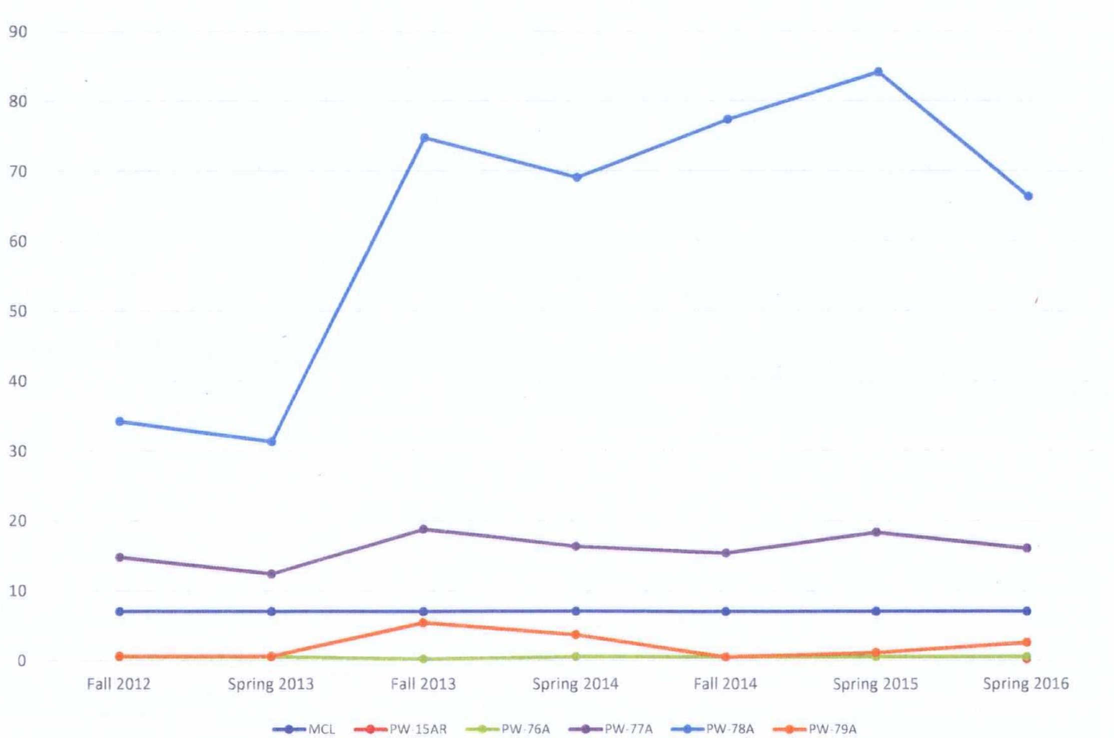

Figure G-7. DCE Concentrations, East Perimeter Area

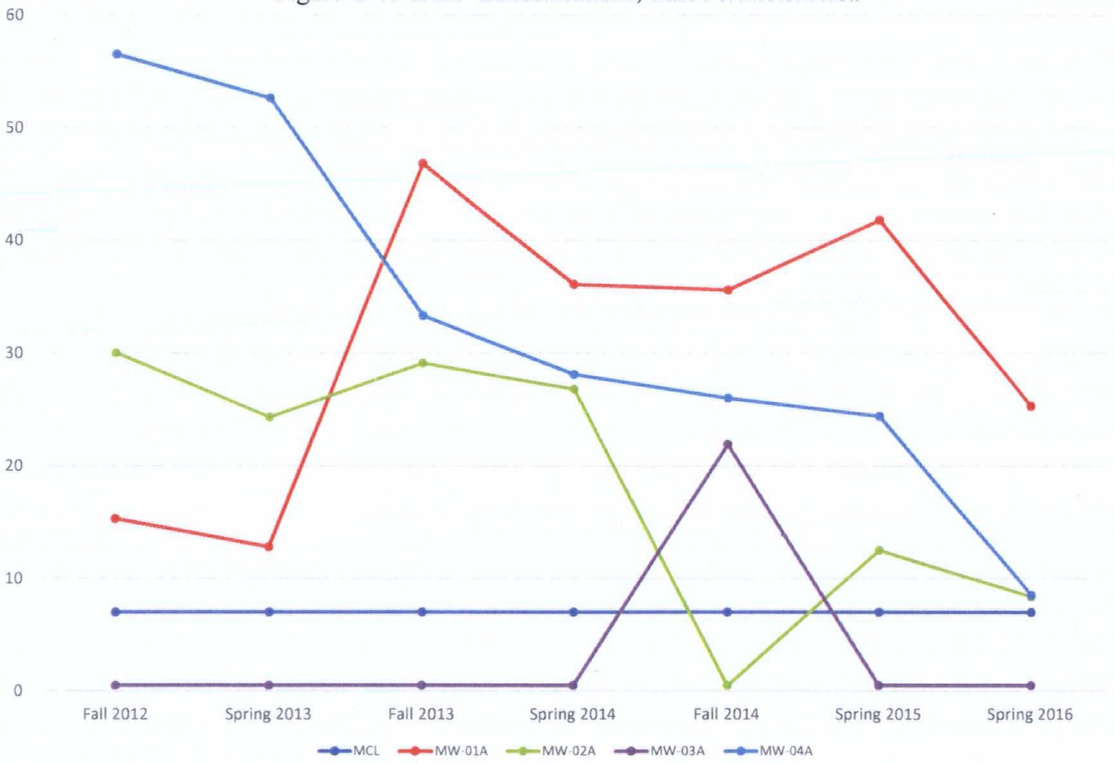

Figure G-8. Nitrate Concentrations in the Acid Sump Area

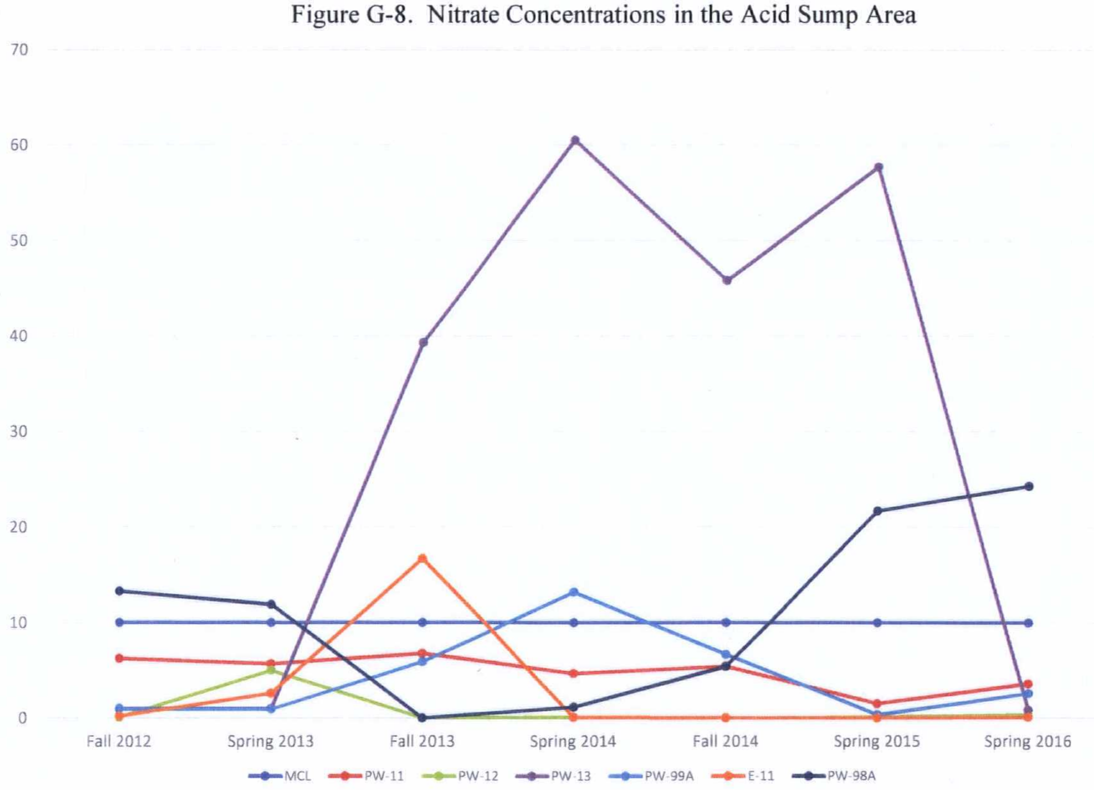

Figure G-9. Nitrate Concentrations in the Ammonium Sulfate Storage Area

Figure G-10. TCE Concentrations in the Acid Sump Area

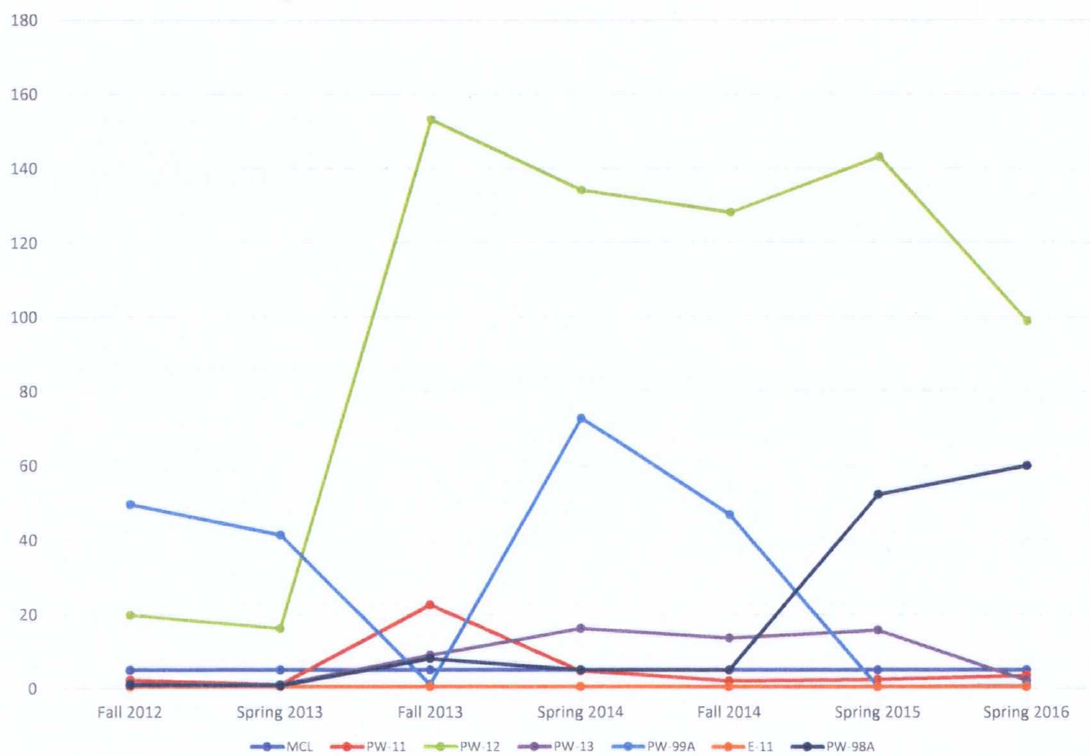

Figure G-11. TCE Concentrations in the Material Recycle Area

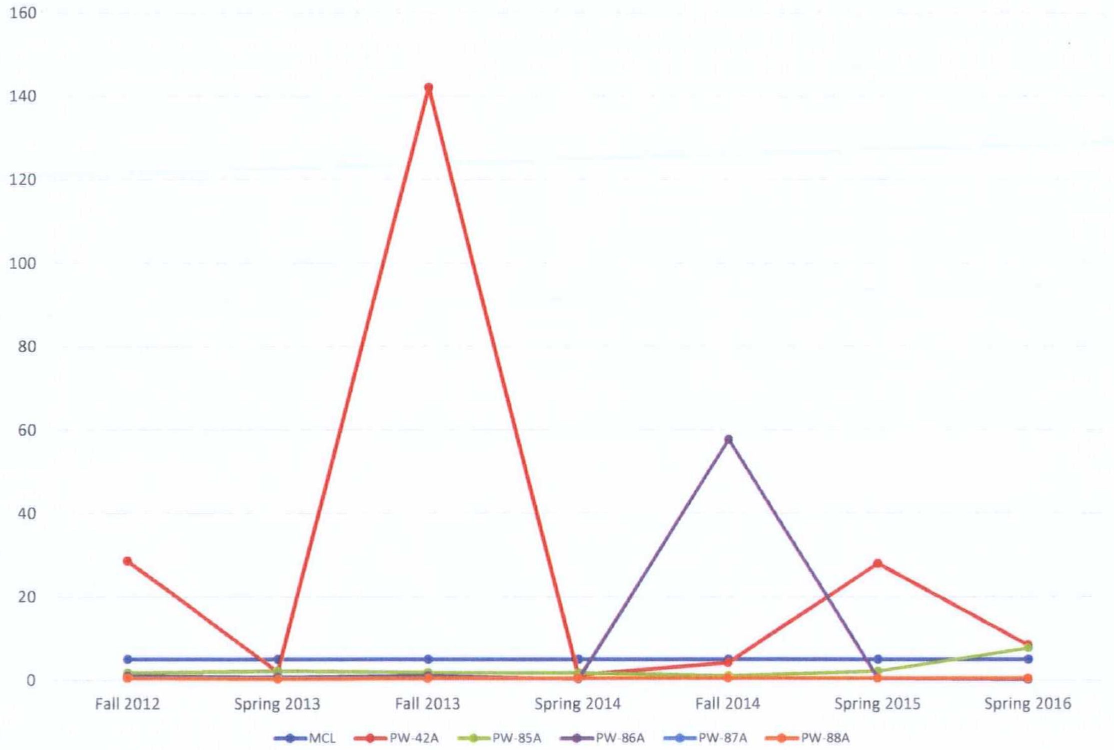

Figure G-12. TCA Concentrations, Acid Sump Area

Figure G-13. TCA Concentration, Former Crucible Cleaning Area

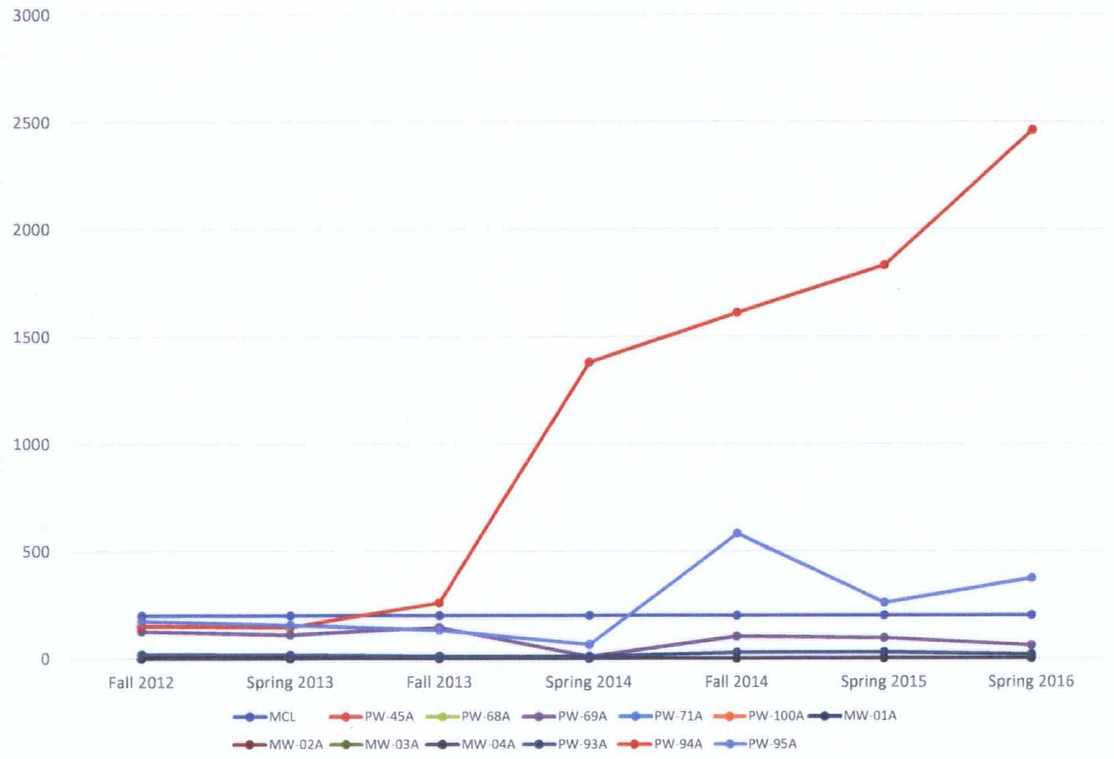

Figure G-14. Radium 226/228 in Feed Makeup Area